FRA OR&D 75-42

RRIS

RAILROAD RESEARCH BULLETIN

Spring 1975
Volume 2 Number 1

U.S. DEPARTMENT OF TRANSPORTATION
Federal Railroad Administration

Prepared under contract by:

Railroad Research Information Service
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16. Abstract

This publication contains 1,176 abstracts of journal articles and research reports selected by RRIS from current railroad literature and 235 summaries of ongoing research activities in the railroad field. This material covers the entire range of railroading from technology to operations, management, economics and government involvement. Literature sources are worldwide. The material is arranged according to the RRIS classification scheme in two separate sections, one for journal and report abstracts and one for ongoing project summaries. The book also contains subject term, author, and source indexes. It supplements the material contained in the four prior Railroad Research Bulletins which should be retained for a complete file of RRIS data.

The publication is available on a regular subscription basis from Railroad Research Information Service, Transportation Research Board, 2101 Constitution Avenue, N.W., Washington, D.C. 20418. Batch-mode computerized and manual file searches of specific subject areas are available directly from RRIS.

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RAILROAD RESEARCH BULLETIN

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RAILROAD RESEARCH BULLETIN

Spring 1975
Volume 2 Number 1
Publication 7501

This Bulletin, containing 1,176 abstracts of journal articles and research reports and 235 summaries of ongoing research activities in the railroad field, is produced by the Railroad Research Information Service. Financial support for the operation of RRIS within the Transportation Research Board is provided by the Federal Railroad Administration of the U.S. Department of Transportation.

Each Bulletin contains new information and is not cumulative. Previous editions should be retained to ensure that the user has a complete record of the RRIS accessions.

Railroad Research Information Service
Transportation Research Board
Commission on Sociotechnical Systems • National Research Council
National Academy of Sciences

Railroad Research Information Service

The Railroad Research Information Service (RRIS) was developed within the National Research Council under contract to the Federal Railroad Administration of the U.S. Department of Transportation.

The RRIS computerized data system incorporates information on the planning, building, managing, operation, and regulation of rail transportation systems. A primary objective is to acquire and select information that will be timely and useful.

The scope of RRIS includes rail rapid transit. All items in the RRIS file are classified according to the basic system and there is no separate classification for transit material. Items pertaining to rail transit can be identified under the term "Rapid Transit Systems" in the Subject Term Index, where the accession numbers for such items are listed.

Two types of data are stored in the RRIS system—abstracts of articles and reports that are within the RRIS scope and summaries of ongoing and recently completed research projects. The abstracts and the summaries are arranged in separate sections, as indicated in the table of contents. In addition to acquisition and selection, RRIS work includes the classification, indexing, storage, retrieval, and dissemination of abstracts and summaries. Concepts and procedures are similar to those of the other transportation research information services within the National Research Council—the Highway Research Information Service (HRIS) and the Maritime Research Information Service (MRIS).

The Railroad Research Bulletin, published semiannually, contains abstracts and summaries added to the RRIS file during the preceding six months. Previous editions should be retained.

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Table of Contents

Using the Railroad Research Bulletin

This volume is divided into three major sections—abstracts of documents; summaries of ongoing research; and indexes by subject, author, and source.

If you are interested in reviewing reports of completed research and other published documents, turn to the Abstracts section, which begins on page 1. The material in this section is arranged by RRIS subject categories according to the numbered subject areas indicated in the table of contents. The category with its corresponding code number appears at the top of each page.

If you are interested in summaries of ongoing research projects, turn to the Ongoing Research section, which begins on page 167. These summaries are also arranged by subject areas, with each category appearing at the top of the page, along with the corresponding code number followed by an "A" (for active) to indicate that this is an ongoing project.

If you can identify your interest by subject, turn to the Subject Term Index starting on page 213. Each term in this index is followed by the accession numbers of applicable abstracts or summaries. Each accession number consists of two digits that identify the subject area and six digits that identify the individual document under that subject area. Again, if an A follows the subject category digits, this indicates that the particular item is a summary of an ongoing research report; these are printed in italics in each index listing. The items are arranged in order of ascending accession numbers in their respective sections.

If you are looking for abstracts of articles or reports written by a particular author or summaries of projects being conducted by a particular investigator, turn to the Author Index on page 225. Look for the individual's last name in the alphabetized listing. Again note the accession numbers and turn to the abstracts or summaries section.

If you are interested in abstracts of articles or reports that appeared in a particular publication or were the work of a specific publisher, or if you are interested in summaries of research projects being conducted by a specific performing organization, turn to the Source Index on page 236. Again note the accession numbers and turn to the proper abstracts or summaries section.

While the Subject Term Index will give a general idea of the scope of the RRIS classification system, there are many other terms that do not happen to appear in this issue but for which there is information available.

Abbreviations

AAR*	Association of American Railroads
AIAA*	American Institute of Aeronautics and Astronautics
AREA*	American Railway Engineering Association
ASCE*	American Society of Civil Engineers
ASME*	American Society of Mechanical Engineers
CIGGT*	Canadian Institute of Guided Ground Transport
DOT*	U.S. Department of Transportation
ECMT*	European Conference of Ministers of Transport
EI	Engineering Index
ESL*	Engineering Societies Library
Fig	Figures
FRA*	Federal Railroad Administration
FY	Fiscal year
GPO*	U.S. Government Printing Office
IEEE*	Institute of Electrical and Electronics Engineers
IPC*	IPC Transport Press Ltd.
IRCA	International Railway Congress Association
IRF	International Road Federation
IRRD	International Road Research Documentation
NAE*	National Academy of Engineering
NAS*	National Academy of Sciences
NRC*	National Research Council
NTIS*	National Technical Information Service
OECD*	Organization for Economic Cooperation and Development
ORE*	Office for Research and Experiments, UIC
OST*	Office of the Secretary of Transportation
PB	Prefix identifying an NTIS accession number
Phot	Photographs
Ref	References
Repr PC	Paper copy of original document
RPI*	Railway Progress Institute
Rpt	Report
RTAC*	Roads and Transportation Association of Canada
SAE*	Society of Automotive Engineers
Shaw	Shaw Publishing Company Ltd.
SNAME*	Society of Naval Architects and Marine Engineers
Tab	Tables
TRB*	Transportation Research Board
TRRL*	Transport and Road Research Laboratory
TSC	Transportation Systems Center
UIC*	International Union of Railways
UITP*	International Union of Public Transport
UMTA*	Urban Mass Transportation Administration
XUM*	Xerox University Microfilms

*See page ix for availability of papers and research reports.

Availability of Research Reports and Journal Articles

An availability statement is included with most abstracts. Addresses for ordering documents are in the abstracts or are with the publisher listing in the Source Index. Copies of reports and articles listed in this publication are not available from the Railroad Research Information Service. When ordering from any source, give full information on the item wanted. When ordering from the National Technical Information Service, be sure to give the NTIS accession number (PB plus six digits) as well as the title and other information. When no availability is specified with an abstract, it is suggested that the user consult an established transportation library. Because a large number of documents are available from a few sources, space and printing costs have been reduced by abbreviating these sources as follows:

AAR
Association of American Railroads
1920 L Street, N.W.
Washington, D.C. 20036

AIAA
American Institute of Aeronautics and Astronautics
Technical Information Service
750 Third Avenue
New York, New York 10017

AREA
American Railway Engineering Association
59 East Van Buren Street
Chicago, Illinois 60605

ASCE
American Society of Civil Engineers
345 East 47th Street
New York, New York 10017

ASME
American Society of Mechanical Engineers
345 East 47th Street
New York, New York 10017

CIGGT
Canadian Institute of Guided Ground Transport
Queen's University
Kingston, Ontario K7L 3N6
Canada

DOT
U.S. Department of Transportation
400 7th Street, S.W.
Washington, D.C. 20590

ECMT
All documents available through OECD (see below)

ESL
Engineering Societies Library
345 East 47th Street
New York, New York 10017

FRA
Federal Railroad Administration
2100 2nd Street, S.W.
Washington, D.C. 20590

GPO
U.S. Government Printing Office
Superintendent of Documents
Washington, D.C. 20402

IEEE
Institute of Electrical and Electronics Engineers
345 East 47th Street
New York, New York 10017

IPC
IPC (America), Incorporated
205 East 42nd Street
New York, New York 10017

NAE/NAS/NRC
National Academy of Sciences
Publication Sales
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

NTIS
National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

OECD
OECD Publications Center
1750 Pennsylvania Avenue, N.W.
Room 1207
Washington, D.C. 20006

ORE
See UIC/ORE below

OST
Office of the Secretary
U.S. Department of Transportation
400 7th Street, S.W.
Washington, D.C. 20590

RPI
Railway Progress Institute
801 North Fairfax Street
Alexandria, Virginia 22314

RTAC
Roads and Transportation Association of Canada
875 Carling Avenue
Ottawa, Ontario K1S 5A4
Canada

SAE
Society of Automotive Engineers
400 Commonwealth Drive
Warrendale, Pennsylvania 15096

SNAME
Society of Naval Architects and Marine Engineers
74 Trinity Place
New York, New York 10006

TRB
Transportation Research Board
Publications Office
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

TRRL
Transport and Road Research Laboratory
Crowthorne, Berkshire RG11 6AU
England

UIC
International Union of Railways, BD
14-16 Rue Jean-Rey
75015 Paris
France

UIC/ORE
For technical reports identified by a report number such as B125/RP3/E:
International Union of Railways
Office for Research and Experiments
Oudenoord 60
Utrecht, Netherlands

UITP
International Union of Public Transport
Avenue de l'Uruguay 19
B-1050, Brussels
Belgium

UMTA
Urban Mass Transportation Administration
400 7th Street, S.W.
Washington, D.C. 20590

XUM
Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, Michigan 48106

RRIS File Searches

The RRIS primary file is maintained on magnetic computer tape. A secondary file is kept in the form of a computer printout of entries. Either file may be searched for specific information. The key to searching either file is the use of appropriate subject terms. The primary (computer) file is searched by the computer; the secondary (printed) file is searched manually.

The RRIS file contains summaries of research projects in progress and abstracts of published works, together with the appropriate documentation and bibliographic data. The output from the file search is in the form of a computer-printed list from a search of the magnetic tape file and as photocopies of listings in the case of a manual file search. Such computer-generated lists are similar in format to those used in this publication.

The fee schedules for RRIS file searches reflect the primary support for the service from the Federal Railroad Administration and the nonprofit nature of all National Research Council information services:

Manual Retrieval . . . . . $20 per request plus 20 cents per page photocopy

Computer Retrieval . . . $50 per request plus 25 cents per printout page after screening

Whether computer retrieval or manual retrieval is used is generally decided by mutual agreement between the RRIS staff and the requester after consultation. A written authorization or purchase order is required before the retrieval is actually made.

Availability of RRIS Publications

Previous issues of the Railroad Research Information Service publications are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22151. Order by title and NTIS Accession Number (PB plus six digits).

Title	Special Bibliography: Safety-Related Technology	Railroad Research Bulletin, Developmental Issue	Railroad Research Bulletin, Vol. 1, No. 1	Railroad Research Bulletin Vol. 1, No. 2
Date	March 1973	Autumn 1973	Spring 1974	Autumn 1974
RRIS Number	73S1	7301	7401	7402
NTIS Accession Number	PB 220 220	PB 226 784	PB 233 880	PB 241 042
NTIS PRICES:				
Domestic				
Papercopy	$9.00	$8.00	$9.25	$11.25
Microfiche	$2.25	$2.25	$2.25	$2.25
Outside United States				
Papercopy	$11.50	$10.50	$11.75	$13.75
Microfiche	$3.75	$3.75	$3.75	$3.75

Sample Abstracts

Abstracts are classified according to an eight-digit code. The first two digits are used to place the abstracts in the proper subject areas according to the RRIS classification scheme (page v). The first two digits appear at the tops of the pages in the Abstracts section of this publication along with the category designation. These two digits and a space precede the final six digits that appear at the top of each abstract. The six-digit number is the RRIS reference assigned to that specific item. Abstracts in each category appear in ascending order of reference numbers, although these usually will not be consecutive. Examples of a report abstract and of a journal article abstract appear below.

Reference Number → 00 071760

Title → RESEARCH TO IMPROVE TUNNEL SUPPORT SYSTEMS

Research Report Abstract →

Studies are described that were directed toward improving the design of certain types of tunnel support systems. Studies to predict the interaction of a circular liner with the medium performed with a linear finite element computer program and a closed form solution are described. Two construction techniques that give different interaction solutions and thus different liner loadings were simulated. Results are presented in the form of dimensionless plots from which moment, thrust, shear and deformation can be predicted. Steel-fiber-reinforced regulated-set-cement concrete has been proposed for use in a slipformed tunnel liner system. Mix design, pumping characteristics and mechanical properties of this material are described. Also, test results for two specimens which represent a portion of the slipformed liner are presented. Behavior of the liner and resisting mechanism was found to be highly nonlinear and to have a great deal of reserve strength beyond the linear range. Eleven large-scale tests which simulate steel horseshoe sets in rock tunnels are described and the effects of connection characteristics, blocking stiffness, load distribution and load inclination on the set behavior are discussed. Both the concrete liners and the steel sets that were tested, were simulated by a linear (STRUDL) and a nonlinear analysis (NASTRAN) and the results compared with those obtained from the tests.

Supplementary Notes → This study was sponsored by and prepared for the Federal Railroad Administration, DOT.

Authors, Publication Data, Document Data → Paul, SL Gaylord, EH Hendron, AJ Kesler, CE Mohraz, B Peck, RB Illinois University, Urbana, (UILU-ENG-74-2016) Final Rpt. FRA-ORD7D 74-51, June 1974, 235 pp, Figs., Tabs., 1 App.

Activity Data → Contract DOT-FR-30022

Source of Abstract → ACKNOWLEDGMENT: FRA

Availability → PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-235762, DOTL NTIS

Reference Number → 00 071769

Title → EFFECT OF ENVIRONMENT ON RAPID TRANSIT CONSTRUCTION

Journal Article Abstract →

Rapid transit systems must be constructed in a hostile environment. The space required for construction is already crowded. Hinderance of traffic must be avoided or minimized. Existing utility systems and adjacent structures must be maintained and remain useful during construction and must be restored to as good as, or better than, original condition upon completion. Care must be exercised to minimize imitation or harm to the public. All these factors cost extra expense and time, but the effect may be lessened by preparatory work, by vigorous public relations, by working closely with governing officials, and by timely acquisition of real estate.

Author, Publication Data, Document Data → Kline, GO *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE2, 9751, May 1973, pp 367-370

Source of Abstract → ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering

Availability → PURCHASE FROM: ESL Repr. PC, Microfilm

Sample Summary of Ongoing Research

The ongoing project summaries in the section beginning on page 167 describe research activities currently in progress or recently completed. Each record describes who is performing the project, who is funding it, and how the research goal is to be attained. A project summary is not a document surrogate; that is, there is not necessarily a full report published on the project. The summaries use the following format, although it should be noted that each record may or may not contain all the elements described below.

Reference Number → **02 058303**

Project Title → **FREIGHT CAR TRUCK DESIGN OPTIMIZATION**

Project Summary →

The Truck Design Optimization Project (TDOP) is a multiyear project intended to evaluate performance characteristics of existing railroad freight car trucks; determine through cost-benefit analysis the feasibility of improving truck performance by mechanical modification of existing type trucks or technical introduction of new truck designs that respect carbody/suspension system interfaces or are otherwise compatible with existing freight train systems; provide performance and testing specifications for use in the development of freight car suspension systems, and study concepts of integrated carbody support systems and advanced designs in anticipation of future railroad requirements.

Agency Performing the Work → PERFORMING AGENCY: Southern Pacific Transportation Company

Project Investigators → INVESTIGATOR: Byrne, R (Tel. 415-362-1212X-22547)

Project Sponsors → SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations

Contract Monitor → RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel. 202-426-0855)

Project Data → STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: $ 1325255 Contract DOT-FR-40023

Source of this Summary → ACKNOWLEDGMENT: FRA

Abstracts of Reports and Journal Articles

00 052502
STATISTICAL DISTRIBUTION OF AXLE LOADS AND STRESSES IN RAILWAY BRIDGES. INTRODUCTION AND DEFINITIONS
This report presents the introductory philosophy to the analysis of strains in railway bridges subjected to traffic. The fundamental terms for the dynamics and random vibrations of bridges, statistics and probability are defined. These definitions are accompanied by illustrative examples with applications to railway bridges. Several methods for the solution of the question are suggested.

International Union of Railways D128/RP1/E, Apr. 1973, 16 pp, 20 Fig., 5 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

00 052508
BRAKING AND ACCELERATION FORCES ON BRIDGES. BRAKING AND STARTING TESTS ON A STEEL BRIDGE OF 30M SPAN WITH A BALLAST BED.
The report contains the results of measurements taken during braking tests on a steel bridge of 30 m span with uninterrupted ballast bed. Indications are given concerning the distribution of the braking forces in bridge bearings, rails and ballast bed; the greater part is transmitted to the fixed bearing and rails, whereas the ballast bed takes only a minor part of these forces.

International Union of Railways D101/RP5/E, Apr. 1973, 29 pp, Figs., Tabs., 12 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

00 052523
PROBLEMS OF HIGH STRENGTH BOLTED CONNECTIONS IN STEEL CONSTRUCTION. THE EFFECT OF WEATHERING ON ASSEMBLED HIGH STRENGTH BOLTED CONNECTIONS UNDER VARIOUS CONDITIONS
The report describes tests with unprotected and protected faying surfaces of bolted test specimens, exposed, after assembly, to accelerated weathering in an SO sub 2 atmosphere in the Kesternich apparatus and subsequently subjected to a static tensile test of short duration in order to determine the coefficient of friction. The weathering of the externally unprotected test specimens during 20-60 test cycles should show the effect of increased corrosion on the coefficient of friction and on the losses in pretension of the bolts. The report also describes the determination of friction coefficients of faying surfaces treated with alkaline silicate zinc dust paint, exposed, prior to assembly, to natural weathering in a marine atmosphere for several months and it assesses studies made by other bodies concerning the various effects of weathering before and after the assembly of high strength bolted connections.

International Union of Railways D90/RP 7/E, Apr. 1973, 30 pp, Figs., Tabs., Phots., 2 Ref., 22 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

00 052536
INVESTIGATION OF BRIDGE DECKS WITH CONCRETE ENCASED GIRDERS. STATIC TESTS ON EXPERIMENTAL DECKS NOS. 2 AND 3
This report is divided into two parts: 1) Description and results of the static tests on experimental deck No. 2 (Report RP 2A)-Test on a model light-concrete deck with a 3.60 m span, consisting of three HE 140 B girders. The slab is constructed in accordance with UIC recommendations and consequently in the same way as experimental deck No. 1; and 2) Description and results of the static test on experimental deck No. 3 (report RP 2B)-The model, again with a 3.60 m span, consists of a slab made of rich-mix concrete)comparable with that of deck No. 1), but with three inverted-T section girders made from welded flat profiles. The steel sections of these are similar to those of the girders used in decks Nos. 1 and 2.

International Union of Railways D123/RP 2/E, Apr. 1973, 42 pp, 22 Fig., Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

00 052561
PROBLEMS OF HIGH STRENGTH BOLTED CONNECTIONS IN STEEL CONSTRUCTION. SUMMARISED CONTENTS OF REPORTS NOS. 1-7
In this Final Report on ORE Question D 90, the programme of work, the preparations, the execution and results of the ORE tests from 7 interim reports and similar studies by other bodies are summarized and evaluated in conclusions and recommendations. The studies referred to: (1) effect of methods of preparing faying surfaces; (2) effect of the protection of faying surfaces on the coefficient of friction; (3) effect of weathering exposure before and after assembly on the coefficient of friction of protected and unprotected faying surfaces; (4) effect of sustained static loading and temperature variations on the behavior of connections; (5) effect of dynamic loads on the behavior of connections (fatigue tests); and (6) protection of bolts, nuts and washers.

International Union of Railways D90/RP 8/E, Oct. 1973, 68 pp, 10 Fig., 7 Tab., 111 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

00 057334
FLOOD PLAIN ENGINEERING AND MANAGEMENT IN CHICAGO
The Chicago area because of its unfortunate topographical setting, rampant growth and inadequate regulatory authority is one of the most severely flood plagued urban areas in the world. The annual average flood damages approximate 30 million dollars. The complexity of government controls and responsibilities contribute to the situation. Villages and counties have zoning and building control vested in them but are reluctant to control growth. A master plan is currently underway enlisting the aid of several levels of government officials that promises to alleviate flooding without forcing any level to surrender autonomy. A portion of the plan, the Upper Salt Creek Watershed, is examined.

Lanyon, R *ASCE Civil Engineering* May 1974, pp 79-81

ACKNOWLEDGMENT: ASCE Civil Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

00 057341
LONDON-CHANNEL TUNNEL RAIL LINK
Indications of the route and other characteristics of the 25 kV ac electrified high-speed line between London and the English Channel Tunnel terminal near Folkstone have been given in several previous issues of Modern Railways, notably in that of April 1972. Earlier this year British Railways Board published a document for consultation entitled "Channel Tunnel: London-Tunnel New Rail Link." Fully illustrated with maps and plans, the booklet fills in details not hitherto published and indicates some modifications. Its avowed purpose is to inform the public of the character of the proposed new rail link which the outgoing Conservative Government believed to be an essential complement to the Tunnel itself, and to provide an opportunity for expression of views on its possible environmental consequences.

Modern Railways Vol. 31 No. 309, June 1974, pp 240-243, 3 Phot.

ACKNOWLEDGMENT: Modern Railways
PURCHASE FROM: XUM Repr. PC

00 057351
LAND ACQUISITION AND CONVEYANCING BY URBAN TRANSPORTATION AUTHORITIES: A CASE STUDY OF METRO
The study investigates the plans, programs and operations of WMATA with regard to real estate acquisitions with special emphasis placed on the preparation and conveyancing of title to WMATA. In order to accurately investigate the preparation and conveyancing practices, it was necessary to work closely with Land Title Insurance Company and attorneys with whom WMATA had contracted to do this work. As a direct result of the investigation and analysis, included in this report are guidelines which should be of assistance to other urban transportation authorities involved in the acquisition of real estate. A bibliography is included.

Ryan, TTJ
Consortium of Universities, (UMTA-DC-11-0003) Res. Rpt. .UTC-04-73, May 1973, 63 pp

ACKNOWLEDGMENT: NTIS (PB-232314/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-232314/5, DOTL NTIS

00 057423
STEEL FIBROUS SHOTCRETE
The fibrous concrete was used to stabilize a section of relocated Camas Prairie Railroad track that had been threatened by falling rock from an adjacent basalt cut for the past 5 years. A slight modification to the gunning machine was the key to successful completion of the contract for steel fibrous shotcrete. Application methods are discussed.

Kaden, RA (Army Corps of Engineers) *Western Construction* Vol. 49 No. 4, Apr. 1974

ACKNOWLEDGMENT: EI (EIX740603409)
PURCHASE FROM: ESL Repr PC, Microfilm

00 057435
MODERN TUNNELING METHODS SPEED MONTREAL METRO
The method described is to advance a tunnel section on two faces concurrently from a centrally located access shaft. Two gantry-type jumbo drills are used each equipped with five Tamrock hydraulic booms and drills.

Engineering and Contract Record Vol. 87 No. 3, Mar. 1974

ACKNOWLEDGMENT: EI (EI 74 600034)
PURCHASE FROM: ESL Repr PC, Microfilm

00 057436
SILENT UNDERGROUND TO HEATHROW
Access to London's Heathrow airport will be improved by a new extension of the Underground railway. Natural-rubber bearing pads will ensure that houses near the new line are not disturbed by traffic vibration. The extension, 3.5 mi (5.6 km) long, will be in a tunnel constructed by the cut and cover technique. A novel feature of the line is that in the residential area of Hounslow the track is not laid directly on the floor of the tunnel. Instead it is contained in reinforced concrete troughs, each 7m (22 ft) long and weighing about 20 tons. After the concrete has set the precast units are lowered into place with specially designed handling equipment. The separate troughs are then joined with in situ concrete to form two continuous parallel decks. It is here that the natural rubber bearings become involved. They fulfil a dual role. They function as transverse strip bearings. Each trough is symmetrically supported by two rows, 18 ft (5.4 m) apart, of five bearings. These take care of the vertical load. In addition, bearings will be inserted between each trough and the tunnel wall, and between the two troughs; here they function as supporting side bearings.

Rose, IG (National Rubber Producers Research Association) *Noise Control and Vibration Reduction* Vol. 5 No. 2, Mar. 1974, 13 pp, 1 Ref.

ACKNOWLEDGMENT: EI (EI 74 605171)
PURCHASE FROM: ESL Repr PC, Microfilm

00 057444
TOWNLINE ROAD/RAIL TUNNEL DESIGN
The purpose of the paper is to describe some of the innovative design concepts adopted on this project where unusual foundation conditions were encountered. The paper also describes the construction procedures which were used to minimize shrinkage cracking of the concrete and accommodate seasonal temperature movements without the usual leakage problems. The tunnel project is part of the recently completed Welland Channel Relocation which was undertaken by the St. Lawrence Seaway Authority to speed up ship movement in the Welland Canal by straightening and widening the 10-mile section through Welland and, at the same time, concentrating road and rail traffic in tunnels to avoid interaction with the Seaway traffic.

Maitland, ST (Acres Consulting Services Limited); Coldwell, KL (Saint Lawrence Seaway Authority); Earle, G (BBR Canada Limited) *Engineering Journal (Canada)* Vol. 57 No. 3/4, #73-CSCE-18, Mar. 1974, pp 17-22, 8 Fig., 3 Ref.

ACKNOWLEDGMENT: Engineering Journal (Canada)
PURCHASE FROM: Engineering Institute of Canada 2050 Mansfield Street, Montreal 110, Canada Repr. PC

00 057449
MODERN SURVEYING PROCEDURES USED IN THE CONSTRUCTION OF THE MARSHALLING YARD AT MASCHEN [Neuzeitliche Vermessungsverfahren Beim Bau Des Rangierbahnhofs Maschen]
Described here is the use of electronic distance measuring and a programmable desk-top calculator for the surveying work in connection with the new marshalling yard being built at Maschen near Hamburg. The advantages compared with the methods hitherto used are explained. [German]

Spinger, H *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 59-66, Figs., 1 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

00 057512
RECENT DEVELOPMENT OF NEW AUSTRIAN TUNNELING METHOD
A support technique characterized by reliance on the carrying capacity of the rock or surrounding soil rather than on heavy wood, steel, or concrete support systems has evolved during the last decade in Europe. Carrying capacity is mobilized by thin, semirigid linings adhering directly to the surround (i.e., usually shotcrete) and system anchoring. Frequent measurements, experience, and a thorough theoretical understanding of time-deformation-stress relations of the rock or soil surround, of the measures to be provided, and their interaction are required to achieve optimum rock loads, made possible by the most advantageous stress distribution within the mostly self-carrying surround. Recent theoretical and experimental advances, and recent site experience at two large tunnel projects, are described.

Nussbaum, H *ASCE Journal of the Construction Division* Proc Paper Vol. 99 No. C01, #9836, July 1973, pp 115-132

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

00 057555
CONCRETE FORMWORK FOR WASHINGTON, D.C. METRO
Special concrete forming methods have been developed to meet the engineering requirements of underground subway stations being built as part of the 97.7 mile Metro System in Washington D.C. Size and height of the main terminus in this system made the use of a reblocking and piggyback traveler neccessary for forming the arch and sidewalks. This station has two different levels of track to accommodate intersecting right-of-ways. Because of the deep set coffered effect on the station ceilings, radial knuckle arrangement was required on the forms to permit the direction of withdrawal to be varied along the length of the form. For one station, sidewall and arch forms are specially equipped so that they can be placed and stripped without interfering with beams for a pedestrian walkway.

Bodziuch, JJ *ASCE Civil Engineering* July 1974, pp 76-78

ACKNOWLEDGMENT: ASCE Civil Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

00 057556
ON THE UNION PACIFIC—USE OF SUPER-SPAN SIMPLIFIES CONCRETE ARCH EXTENSION JOB
Super-Span is a combination of corrugated steel plates, concrete "ears" and soil, so arranged as to work together to enhance the ability of the structure to withstand relatively heavy loads. Once the plates have been put together backfill material is compacted around both sides and on the top of the structure.

Railway Track and Structures Vol. 70 No. 7, July 1974, p 17, 2 Phot.

ACKNOWLEDGMENT: Railway Track and Structures
PURCHASE FROM: XUM Repr. PC

00 057557
BIG BLOW HITS PC-HIGH WINDS HURL GIRDER SPANS INTO RIVER
Most railroaders in the maintenance of way and structures department have seen examples of what extreme manifestations of nature can do to railroad property. On April 3, 1974 in Monticello, Indiana, a tornado lifted four 105 ft. long spans, each weighing 114-tons, off the substructure of Penn Central's bridge no. 21.07 across the Tippecanoe River. Before restoration could begin each span had first to be lifted from the river and inspected for either repair and reuse or replacement. The methods and procedures used for restoration are discussed.

Railway Track and Structures Vol. 70 N July 1974, pp 20-21, 3 Phot.

ACKNOWLEDGMENT: Railway Track and Structures
PURCHASE FROM: XUM Repr. PC

00 057724
THE HEAT INPUT OF UNDERGROUND RAILWAYS
Increases in acceleration and speeds and consequent higher power, combined with a denser traffic pattern bring about rises in heat input and the data presented enables the volume of air required to be estimated.

Koffman, JL *Rail Engineering International* Vol. 4 No. 5, June 1974, p 213

PURCHASE FROM: ESL Repr. PC, Microfilm

00 057742
STRENGTHENING A FIFTY-YEAR-OLD VIADUCT
The strengthening of a nine-span, 50-year-old reinforced concrete viaduct on a British industrial railway to handle heavier cars first involved a survey of the structure because no drawings were available. Since details of the reinforcement were not known, it was not possible to calculate the ability of the structure to take increased loading. Consultants recommended the application of stressed alloy-steel tendons to the lower edges of each beam with these members subsequently being gunited in place. Stresses in reinforcements and concrete under new loadings are less that those in the original structure under the lower loadings.

Crozier, AC *Concrete* July 1974, pp 22-25, Figs., Phots.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 057858
STUDY OF PREVENTIVE MEASURES FROM THE ACCUMULATION OF SNOW ON THE RAILWAY TRACK
In order to prevent possible snow damage on the railway lines in cold regions, a snow-free track structure has been devised and tested with an experimental structure constructed near Ohmagari on the Ohu Line. The report describes the tests conducted to evaluate the possibility of using a river stream as the snow removing media under various conditions of the air and water temperatures, the snowstorm, the depth of water, etc. and also the adverse effects on the flow of streams by gusts caused by high-speed trains.

Hikita, S *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 76-78

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

00 057869
STRESSES AND TRAINS
Most railway structural analysis jobs can be tackled effectively using British Rail's own computer programs. A team of engineering analysts works between the designer and the computer, guiding the designer towards structural idealization in terms of accuracy and cost. In 1967 three-dimensional analyses were applied to concrete bridges using a finite element program with panel, plate and beam elements. A box-girder program using a finite strip method was also introduced. Late in 1969 a general-purpose finite element program, NEWPAC, came into use with a wider range of elements, simpler input and checking, increased capacity and full detailed output processing.

Scholes, A *Civil Engineering* No. 814, May 1974, pp 28-31, 4 Fig.

PURCHASE FROM: Morgan-Grampian (Profession Press) Limited Morgan-Grampian House, Calderwood Street, London SE18 6QH, England Repr. PC

00 057872
VIBRATION REDUCTION BY VIBRATION-PROOF MATS IN TOKYO SUBWAY
Noises and vibrations produced by trains running in a subway tunnel propagate through earth and sometime affect nearby buildings. While noises and vibrations resulting from the contact of wheels and rails are the principal source, the most effective way to reduce the problem is to alter the track structure. Vibration-proof mats of used rubber tires are used under the ballast of the Chiyoda Line. They functioned as desired but the track settled about 3 mm on account of reduced elasticity.

Also available through Japan Railway Civil Engineering Association.

Fujiwara, T Nakamura, S Kazamaki, T (Teito Rapid Transit Authority, Japan) *Permanent Way* Vol. 15 No. 3, No. 56, p 28

ACKNOWLEDGMENT: Permanent Way
PURCHASE FROM: ESL Repr. PC, Microfilm

00 057873
EXPERIMENTAL TESTS ON VIBRATION-PROOF TRACKS AND THEIR EFFECTS
To minimize vibrations and noise from subway operation under a primarily residential area, a new line incorporated test sections of rubber mats under crushed-stone ballast, neoprene strips in a cast concrete roadbed, and vibration-proof asphalt concrete under crushed stone. The mats proved most effective but would invite greater settling of the track, complicating maintenance. The concrete slab, while more expensive, would minimize maintenance but would be costly to restore once performance had deteriorated. The vibration-proof asphalt concrete was not effective.

Also available through Japan Railway Civil Engineering Association.

Fujiwara, T Nakamura, S (Teito Rapid Transit Authority, Japan) *Permanent Way* Vol. 15 No. 3, No. 56, pp 20-28

ACKNOWLEDGMENT: Permanent Way
PURCHASE FROM: ESL Repr. PC, Microfilm

00 071625
H-BEARING PILES IN LIMESTONE AND CLAY SHALES
A pile test program was used to finalize the foundation design for railroad bridge piers founded on H-bearing piles driven through alluvial and gla-

ciofluvial deposits into bedrock of the Pennsylvania system. Twenty-four test piles were driven for length determination and 14 piles were extracted to check for damage during driving. The design bearing capacity was verified with 10 static load tests. Adequate bearing could be obtained for a design pile load of 50 tons by either founding on a thin hard limestone stratum or driving into about 10 ft of shale. The pile capacity was not significantly altered by remolding of the shale or breakup of the limestone strata. The pile extraction program showed the piles were damaged if driven through the limestone strata.

Ashton, WD Schwartz, PH *ASCE Journal of the Geotechnical Engineering Div* Proc Paper Vol. 100 No. GT7, #10667, July 1974, pp 787-806

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

00 071628
FATIGUE STRENGTH OF STEEL BEAMS WITH WELDED STIFFENERS AND ATTACHMENTS
Following an intensive study of the fatigue behavior of steel bridge members, researchers at Lehigh University recommend changes in the Standard Specifications for highway bridges published by the American Association of State Highway and Transportation Officials and in specifications of the American Welding Society and the American Railway Engineering Association. In the past, only approximate general design relationships have been possible on the basis of the limited existing experimental data. Some 157 steel beams and girders were fabricated and tested, primarily to define the fatigue strength of transverse stiffeners and attachments under constant-amplitude fatigue loading. Stress range accounted for nearly all the variations in fatigue life.

Research sponsored by the American Association of State Highway and Transportation Officials in cooperation with the Federal Highway Administration.

Fisher, JW Albrecht, PA Yen, BT Klingerman, DJ McNamee, BM (Lehigh University) *Transportation Research Board NCHRP Reports* No. 147, 1974, 85 pp, Figs., Tabs., 54 Ref., 7 App.

PURCHASE FROM: TRB Repr. PC

00 071760
RESEARCH TO IMPROVE TUNNEL SUPPORT SYSTEMS
Studies are described that were directed toward improving the design of certain types of tunnel support systems. Studies to predict the interaction of a circular liner with the medium performed with a linear finite element computer program and a closed form solution are described. Two construction techniques that give different interaction solutions and thus different liner loadings were simulated. Results are presented in the form of dimensionless plots from which moment, thrust, shear and deformation can be predicted. Steel-fiber-reinforced regulated-set-cement concrete has been proposed for use in a slipformed tunnel liner system. Mix design, pumping characteristics and mechanical properties of this material are described. Also, test results for two specimens which represent a portion of the slipformed liner are presented. Behavior of the liner and resisting mechanism was found to be highly nonlinear and to have a great deal of reserve strength beyond the linear range. Eleven large-scale tests which simulate steel horseshoe sets in rock tunnels are described and the effects of connection characteristics, blocking stiffness, load distribution and load inclination on the set behavior are discussed. Both the concrete liners and the steel sets that were tested, were simulated by a linear (STRUDL) and a nonlinear analysis (NASTRAN) and the results compared with those obtained from the tests.

This study was sponsored by and prepared for the Federal Railroad Administration, DOT.

Paul, SL Gaylord, EH Hendron, AJ Kesler, CE Mohraz, B Peck, RB Illinois University, Urbana, (UILU-ENG-74-2016) Final Rpt. FRA-ORD7D 74-51, June 1974, 235 pp, Figs., Tabs., 1 App.

Contract DOT-FR-30022

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235762, DOTL NTIS

00 071769
EFFECT OF ENVIRONMENT ON RAPID TRANSIT CONSTRUCTION
Rapid transit systems must be constructed in a hostile environment. The space required for construction is already crowded. Hinderance of traffic must be avoided or minimized. Existing utility systems and adjacent structures must be maintained and remain useful during construction and must be restored to as good as, or better than, original condition upon completion. Care must be exercised to minimize imitation or harm to the public. All these factors cost extra expense and time, but the effect may be lessened by preparatory work, by vigorous public relations, by working closely with governing officials, and by timely acquisition of real estate.

Kline, GO *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE2, 9751, May 1973, pp 367-370

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

00 071783
DYNAMIC DEFLECTIONS OF A SHORT RAILWAY BRIDGE [Dynamiczne Ugiecia Krotkiego Mostu Kolejowego]
The paper contains information concerning the program BEL-3 for a ZAM-2 digital computer which makes it possible to solve the differential equation of vibration of a beam produced by a vehicle moving on that beam at a constant velocity. The rigidity of the beam is assumed to be constant, the load acts in the plane of symmetry of the beam, its axis is rectilinear before deformation, and the mass of the vehicle cannot be disregarded in comparison with the mass of the beam. The paper presents the method of derivation of the set of differential equations and the scheme of its solution under the assumption that the beam may be considered as a system with one degree of freedom. [Polish]

Boblewski, J *Rozprawy Inzynierskie* Vol. 21 No. 3, 1973, pp 501-505, 2 Ref

ACKNOWLEDGMENT: EI (EI 74 802076)
PURCHASE FROM: ESL Repr PC, Microfilm

00 071792
GEOTECHNICAL CONSIDERATIONS IN PLANNING OF CLOSE-TO-SURFACE EXCAVATIONS IN URBAN AREAS, DESCRIBED IN AN EXAMPLE OF THE SUBWAY TUNNEL IN THE CITY OF LEIPZIG, EAST GERMANY [Geotechnische Erwaegungen bei der Planung von Oberflaechennahen Hohlraumbauten in Stadtraeumen, Dargestellt unter Verwendung des Biespiels des Geplanten V-Bahn-Tunnels in Leipzig]
Special aspects of the underground excavations in urban areas consist of the confrontation with the fixed municipal installations. Under these assumptions, this paper describes various applications of the most important tunnel-configurations, when excavated from the surface and covered thereafter. Classification of configurations is made based on the techniques for supporting the vertical walls of the excavation. [German]

Siegmundt, M *Neue Bergbautechnik* Vol. 4 No. 4, Apr. 1974, pp 265-272, 21 Ref

ACKNOWLEDGMENT: EI (EI 74 803133)
PURCHASE FROM: ESL Repr PC, Microfilm

00 071814
SPECIAL SHORING SPEEDS SUBWAY
It is reported how by combining some special forming rigs used on previous San Francisco Bay Area subway jobs with prefabricated grillage shores, it was possible to speed construction of two subway stations beneath a busy San Francisco street.

Western Construction Vol. 49 No. 5, May 1974

ACKNOWLEDGMENT: EI (EI 74 703199)
PURCHASE FROM: ESL Repr PC, Microfilm

00 071935
THE EFFECT OF TIME-DEPENDENT PROPERTIES OF ALTERED ROCK ON TUNNEL SUPPORT REQUIREMENTS
Squeezing ground conditions in hard-rock tunneling are associated with fault zones containing brecciated rock and gouge. The time-dependent nature of the deformation and support loads in squeezing ground conditions suggest that the creep behavior of fault gouge is the significant engineering property controlling the in situ behavior. An experimental and analytical study is presented that deals with soil creep and its application to the prediction of tunnel support requirements in squeezing ground. Support requirements given by the theoretical analysis are compared to numerous case histories obtained from the published literature. Finally,

specific consideration is given to squeezing conditions at Straight Creek and Pacheco tunnels. The analysis provides a method for estimating steel support requirements for tunnels at different depths and in various squeezing ground conditions. (Modified author abstract)

Semple, RM Hendron, AJ Mesri, G
Illinois University, Urbana, (UILU-ENG-73-2023) Final Rpt. FRA-ORD/D-74-30, Dec. 1973, 226 pp

Contract DOT-FR-30022

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB 230207/1, DOTL NTIS

00 071938
TESTING AND EVALUATING OF PROTOTYPE TUNNEL SUPPORT SYSTEMS
The report presents the results of engineering studies related to the development of new and improved tunnel support systems. Steel fiber reinforced regulated-set concrete has been proposed for use as a slipformed concrete lining which can be placed immediately behind a tunnel boring machine. Mix design studies and field pumping tests for this new concrete are described. The results of a cooperative research effort carried out with the U.S. Bureau of Reclamation on precast polymer concrete segmented tunnel support systems include an evaluation of the structural aspects of the system, an analysis of potential heat and fire hazards, and an evaluation of the cost of the promising new support system. (Modified author abstract)

Parker, HW Deere, DU Peck, RB Birkemoe, PC Semple, RM
Illinois University, Urbana, (UILU-ENG-73-20 13) Final Rpt. FRA-ORD/D-74-11, Aug. 1973, 338 pp

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-231912/7, DOTL NTIS

00 071970
INTEGRATED ENGINEERING-PLANNING APPROACH TO THE PRESERVATION, IMPROVEMENT, AND REPLACEMENT OF ELEVATED TRANSPORTATION STRUCTURES
This paper outlines the considerations surrounding the community acceptance of elevated railroad and rapid transit structures, both old and planned for future construction. Covered are such factors as type of neighborhood affected, land use, traffic surveys, urban renewal plans, and environmental considerations. Particular emphasis is placed upon methods of improving existing elevated structures: evaluation of the physical condition and load-carrying ability of the structure, need for structural repairs, and improved analysis techniques. Computer modeling techniques have been applied to these studies. It is shown that through use of these techniques, the transit operator can more accurately plan renewal programs to reflect the community's needs.

Silver, ML (Illinois University, Chicago); Belytschko, TB Gelick, M
Society of Automotive Engineers Spec Pub 1974, pp 44-51, 11 Ref.

ACKNOWLEDGMENT: EI (EI 74 906997)
PURCHASE FROM: ESL Repr PC, Microfilm

00 071988
PRECAST WALLS DROP INTO PLACE IN SIX EASY STEPS
This article describes how working in a tight area and along a busy route was made possible by slipping precast concrete sections into the ground to form smooth, stong subway walls quickly and neatly.

Pilarski, L (McGraw-Hill World News) *Construction Methods and Equipment* Vol. 56 No. 7, July 1974

ACKNOWLEDGMENT: EI (EI 74 901355)
PURCHASE FROM: ESL Repr PC, Microfilm

00 072059
THE CHANNEL TUNNEL
After a century of discussion, traffic volume and engineering technology have made the construction of a channel tunnel feasible at a total cost of 468 million pounds at 1973 prices. The tunnel, as proposed, would run from Cheriton, England, to Frethun, near Calais. It would actually be 3 tunnels—two each carrying a single railway, and a service tunnel in between. Electrically powered trains would carry both freight (containerized and as truck ferry) and passengers. A new rail route would connect the tunnel to London where a new terminal would be built. Through service would be offered to both Paris and Brussels. The tunnel is to be financed primarily by fixed interest loans, plus at least 10 per cent risk capital. The rate of return is expected to be between 14 and 17 per cent. Control after completion would be vested in an Anglo-French Authority. It is expected that the Tunnel will provide substantial benefits to British Railways, because rail connections will be much smoother than current shipping patterns. For this reason no increase in industry immediately around the tunnel is expected. Some reduction in demand for trucking is seen once the tunnel is open. This drop will offset the increase in rail traffic in terms of environmental effect.

Department of the Environment, England Sept. 1973, 75 pp, Figs., Tabs., Refs., 14 App.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Department of the Environment, England Saint Christopher House, Southwark Street, London SE1 0TE, England Repr. PC

00 072442
CUT-AND-COVER TUNNELING TECHNIQUES. VOLUME I. A STUDY OF THE STATE OF THE ART
This study of cut-and cover tunneling techniques in urban areas considers environmental quality, geotechnical investigation and analysis, ground support, ground water control, permanent structure, restoration, cost considerations and major problems. Both United States and foreign techniques are reviewed. In addition to describing alternate methods of construction, it identifies key problems, needed construction improvements, and future research goals.

See also other volume of this report, FHWA-RD-73-41, entitled Volume 2, Appendix, RRIS #072443.

Sverdrup and Parcel and Associates, Incorporated, (FCP 35B1-092) Final Rpt. FHWA-RD-73-40, Feb. 1973, 284 pp

Contract DOT-FH-11-7803

ACKNOWLEDGMENT: Federal Highway Administration
PURCHASE FROM: NTIS Repr. PC

PB-222997, DOTL TE662.A3

00 072443
CUT-AND-COVER TUNNELING TECHNIQUES. VOLUME 2. APPENDIX
This study of cut-and-cover tunneling techniques in urban areas considers environmental quality, geotechnical investigation and analysis, ground support, ground water control, permanent structure, restoration, cost considerations and major problems. Both United States and Foreign techniques are reviewed. This volume consists of summaries of significant articles, summaries of recent noise-control legislation, and the Ontario, Canada, expropriations act.

See also other volume of this report, FHWA-RD-73-40, entitled Volume 1, A Study of the State of the Art, RRIS #072442.

Sverdrup and Parcel and Associates, Incorporated, (FCP-35B1-092) FHWA-RD-73-41, Feb. 1973, 175 pp

Contract DOT-FH-11-7803

ACKNOWLEDGMENT: Federal Highway Administration
PURCHASE FROM: NTIS Repr. PC

PB-222998, DOTL FE662.A3

00 072448
SOIL STABILIZATION
Improvement in the structural properties of soil layers is generally considered to be stabilization whether or not additives are used. Compaction satisfies this objective and one of the five papers presents a rapid method for evaluating the structural benefits of compaction. Three of the papers consider soil-cement mixtures. In a study of cold weather lime stabilization, the prospect of extended construction seasons was studied. Immediate amelioration of wet cohesive soils by quicklime was shown in another study to have a long-term strength gain in most cases.

Transportation Research Record Number 501, 1974, 49 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Repr. PC

00 072452
FIRST TWO MACHINES READY TO EXCAVATE CHANNEL TUNNEL PILOT BORES
The tunneling machines which will begin to drill the service bores under the English Channel for the Channel Tunnel are in place. The British-built machine will bore through impervious lower chalk at a rate of 6 m/h. The cutting head is rotated by hydraulic motors within a drum housing the electro-hydraulic power packs. The U.S.-designed equipment which will be working from the French side has disc cutters. Following the excavating machines will be units that will install the precast tunnel liners.

Railway Gazette International Vol. 130 No. 9, Sept. 1974, p 353, 1 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 072457
LEGAL, ECONOMIC, AND ENERGY CONSIDERATIONS IN THE USE OF UNDERGROUND SPACE
The U.S. National Committee on Tunneling Technology was established in 1972 to stimulate advancement in effective use of the subsurface. Improvements in technology and increased access to the underground result in benefits to society from the availability of additional mineral resources and in opportunities to use underground space for many purposes. Increased access gives rise to problems in legal and other social systems. This workshop examined and discussed the problems and their possible solution. Among the eight papers are: Development of Policy for Airspace; Legal Aspects of Use of the Underground; Planning the Underground Uses; and Economic Trends and Demand for the Development of Underground Space.

Proceedings of a workshop organized by Standing Subcommittee No. 3 of the US National Committee on Tunneling Technology, National Research Council and held in conjunction with the Engineering Foundation Conference, Need for National Policy for the Use of Underground Space, held 24-29 June 1974, in South Berwick, Maine. This book is RANN Report, NSF/RA/S-74-002.

National Academy of Sciences Proceeding 1974, 121 pp, Figs., Tabs., Refs.

Contract C310-268-000

PURCHASE FROM: National Academy of Sciences 2101 Constitution Avenue, NW, Washington, D.C., 20418 Repr. PC

00 072472
EPOXIES RESTORE CRACKED CONCRETE
Use of epoxies to knit concrete structures that have developed structural cracks has been adopted as a regular practice by the Santa Fe. Cracks in concrete supporting structures have been a concern for some time. Cracks in bearing areas have the potential for creating serious problems. Epoxy offers a method for restoration short of recasting. The repairs can be carried out with the need for slow orders or disrupting train traffic. Structural integrity is achieved at a fraction of the cost of alternative repair methods.

Railway Track and Structures Vol. 70 No. 9, Sept. 1974, pp 40-42, Phots.

PURCHASE FROM: XUM Repr. PC

00 072569
THEORY OF CONSOLIDATION FOR CLAYS
A large strain theory of one-dimensional consolidation for normally consolidated and overconsolidated or aged clays which considers the changes in compressibility and permeability during the consolidation and includes secondary compression, shows that the consolidation process in clays is controlled by indexes of compression, recompression, secondary compression, permeability and the critical pressure ratio, load-increment ratio, and the magnitude of total compression. A decreasing compressibility during the consolidation process accelerates the rates of compression and excess pore pressure dissipation, whereas a decreasing permeability retards them. The influence of the load-increment ratio on the rate to consolidation depends on the ratio of permeability index to compression index. The secondary compression has a significant influence on the compression curves; however, it does not affect the dissipation of pore-water pressure appeciably. A fraction of the excess pore-water pressure equal to the critical pressure ratio dissipates at a rapid rate; the remaining pore pressure dissipates at a slower rate.

Mesri, G (Illinois University, Urbana); Rokhsar, A (Tehran Polytechnic, Iran) *ASCE Journal of the Geotechnical Engineering Div* Proc Paper Vol. 100 No. GT8, #10740, Aug. 1974, pp 889-904, 14 Fig., 41 Ref., Apps.

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

00 072570
REDUCING NEGATIVE FRICTION WITH BITUMEN SLIP LAYERS
Negative friction exerted by settling soil layers on foundation elements such as bearing piles can be considerably reduced by providing the elements with a 0.4-in. (10-mm) thick layer slip made of a special grade of bitumen. Theoretical studies at the Koninklijke/Shell/Laboratorium, Amsterdam, have defined the properties the bitumen should have in order to stand up to the conditions of application, storage, driving, and reduction of negative friction. Full-scale trials, including test loadings, have demonstrated these slip layers to be very effective. Depending on the type of foundation and the structure of the soil it is possible to reduce the number of foundation piles required by 15%-50% or even more, at an additional cost of 10%-20% of the cost of the piles driven. About 10,000 piles with bitumen slip layers were used for the foundations of plants of Shell Nederland Chemie in the Netherlands.

Claessen, AIM (Koninklijke/Shell Laboratorium, Netherlands); Horvat, E (Ingenieursburean Dwars, Netherlands) *ASCE Journal of the Geotechnical Engineering Div* Proc Paper Vol. 100 No. GT8, #10764, Aug. 1974, pp 925-944, 16 Fig., 1 Tab., 11 Ref.

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

00 072583
CRYOGENIC TREATMENT OF SHAFTS AND TUNNELS
The advent of cryogenics has added a new dimension to soil freezing in unstable or saturated ground conditions. This article describes how liquid nitrogen was used on part of a sewer tunneling contract for Edinburgh. Liquid nitrogen is particularly useful because of its inert quality, its low boiling point and its ability to be used at locations remote from power supplies.

Harris, JS *Tunnels and Tunnelling* Vol. 6 No. 5, Sept. 1974, pp 69-70, 2 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 072584
CHANNEL TUNNEL SURVEY—THE PROBLEM
The 36-km tunnel under the English Channel between Britain and France presented unusual surveying problems. The author explains the principal objectives of the Channel Tunnel survey and gives a brief description of the route selection. A discussion of the criteria for a suitable grid is followed by a description of the one proposed for the tunnel.

Hulme, TW *Tunnels and Tunnelling* Vol. 6 No. 5, Sept. 1974, pp 43-46, 3 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 072772
PRECAST CONCRETE: ITS USE IN RAILROADING VARIES WIDELY
It is reported that some railroads are making extensive use of this material in bridges, either alone or in combination with wood or steel. Others use it to a lesser extent and some hardly at all.

Railway Track and Structures Vol. 70 No. 8, Aug. 1974, 3 pp

ACKNOWLEDGMENT: EI (EI 74 072828)
PURCHASE FROM: ESL Repr. PC, Microfilm

00 072790
ESTIMATION OF WIND SPEED AND AIR TEMPERATURE FOR THE DESIGN OF BRIDGES
The specification and measurement of wind are described and a number of wind-loading topics are discussed. These include the estimation of the

maximum wind speed expected at any location in a given number of years, the variation of wind speed with height and the size of gusts. The estimation of expected maximum and minimum air temperature and the coexistence of strong winds and extreme temperatures are also considered.

Hay, JS
Transport and Road Research Laboratory LR 599, 1974, 24 PP, 13 Ref.

ACKNOWLEDGMENT: EI (EI 74 068082)
PURCHASE FROM: ESL Repr. PC, Microfilm

00 072807
VIADUCT TO CARRY RAILROAD TRACKS MOUNTED ON PADS IN CONCRETE DECK
Techniques employed by New York State for replacing 11 Long Island Railroad grade crossings with viaducts that have ballastless, tieless tracks on prestressed concrete I-beams spanning up to 104 ft are presented. The all-concrete design is expected to reduce maintenance costs. The three viaduct sections each have a pair of single-track structures. An elevated platform runs between the tracks at stations.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Engineering News-Record Vol. 187 No. 13, Sept. 1971, p 20

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

00 072812
PROTECTIVE METHOD OF EMBANKMENT SLOPE WITH CHEMICAL MATERIALS. THE TILE-ROOFING KAWARAZUMI METHOD
The report describes the effect of a tile-roofing method of protection of the embankment slope examined by using a testing apparatus for artificial rainwater. It is reported that method is effective for prevention of slope rupture.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Kurosawa, A Kobashi, S *Railway Technical Research Institute* Vol. 2 No. 2, June 1970, pp 74-77

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

00 072820
VIBRATION OF SOILS AND FOUNDATIONS
Chapter ten treats methods of analysis and design of dynamically loaded foundations. These methods depend on the design criteria, applied forces, soil response, and analytical procedures for relating these quantities. The design criteria were based on a failure criterion of a limiting amplitude of motion, or a limiting velocity or acceleration of the foundation. The analytical procedures for establishing the dynamic behavior of a foundation relate the applied forces, soil properties, and foundation weights and geometry to the response. By successive corrections of the design parameters, the analytical procedures provide a method for developing a dynamic response of the foundation which falls within the design limits. Several simplified methods of analysis have been discussed in Chapter ten; these have been found satisfactory when the prototype conditions correspond to the assumptions made in establishing the theory. Vibration from subways and a railway is reviewed in Table 10.6.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration. The original article was published in the Prentice-Hall Series in Theoretical and Applied Mechanics.

Richard, FE Woods, RE Hall, JR, Jr
Prentice-Hall, Incorporated 1970, 414 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Prentice-Hall, Incorporated Route 9W, Englewood Cliffs, New Jersey, 07632 Repr. PC

00 072833
EXPERIMENTS ON ARITA RIVER RAILWAY BRIDGE WITH CONCRETE BED
Experiments using four kinds of track structures are described. Two of them use concrete short sleepers or wooden short sleepers on a PC bridge and the other two use steel plates with holes or slabs for fastening rails without sleepers on a RC rigid frame.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Warizawa, Y
Battelle Columbus Laboratories Railway Res. Rpt. #3, Sept. 1970, pp 146-148

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Battelle Columbus Laboratories 505 King Avenue, Columbus, Ohio, 43201 Repr. PC

00 072851
ROADBED/BALLAST
Exploration, testing, and design are discussed, including stability of rock slopes; cuts in soil, sand, and clay; non-uniform soils; loess; foundation of fills; and selection of soils for fills.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

AREA Bulletin No. 631, Jan. 1971, pp 257-290

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

00 072939
CONSTRUCTING WASHINGTON, D.C.'S, METRO SUBWAY
This massive subway project with an eventual $3.9 billion price tag involves extensive tunneling and construction of stations under Washington, D.C., in difficult soil and rock conditions. Many different contractors are at work and there are diverse approaches to construction problems. Underpinning many of Washington's official buildings is a crucial aspect of the project. Nearly 1,000 civil engineers are on the job: Bechtel is overseeing the immense undertaking.

Wilhoyt, EE, Jr. *ASCE Civil Engineering* Vol. 44 No. 11, Nov. 1974, pp 74-77, 2 Fig., 3 Phot.

ACKNOWLEDGMENT: ASCE Civil Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

00 072952
BETTER CONTRACTING FOR UNDERGROUND CONSTRUCTION
Increasing pressure for preservation of surface environments in urban and rural areas is forcing the utilization of subsurface space for transportation and other purposes. Technological developments, such as in rock mechanics and in tunneling machines, will make possible the rapid and successful utilization of subsurface space. For several years it has been recognized that contracting practices in the U.S. are inadequate for even past methods and constitute a serious barrier to application of new technology and to economical development of underground space. This survey of U.S. and foreign underground construction results gives 17 recommendations for improving contracting practices.

Report of a study conducted by Standing Subcommittee No. 4, Contracting Practices, of the U.S. National Committee on Tunneling Technology, NAS-NAE.

National Academy of Sciences, (NSF/RA/S-74-005) 1974, 134 pp, Refs., 8 App.

Contract NSF-C310-274-000

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236973, DOTL NTIS

00 080071
RECENT RESULTS IN FRENCH RESEARCH ON REINFORCED EARTH
The fundamental mechanism of reinforced earth is based on friction between earth and reinforcements. Points of maximum tension in the rein-

forcements separate two zones: an active zone close to the face of the structure and a resistance zone analogous to the anchoring zone in the case of a tie rod. The influence of the fine fraction of the fill on the friction between earth and reinforcements has been studied in laboratory tests on samples of sand and powdered clay mixtures. Calculation methods of traction forces in the reinforcements are presented. A comparison is made between theoretical and experimental values for reinforced earth walls with and without surcharge (full-scale experiment, two-dimensional or three-dimensional models). A method based on the elastoplasticity theory is formulated for reinforced earth foundation rafts.

Schlosser, F Long, NT (Laboratoire Central des Ponts et Chaussees) *ASCE Journal of the Construction Division* Proc Paper Vol. 100 No. CO3, #10800, Sept. 1974, pp 233-237, 12 Fig., 22 Ref., 2 App.

ACKNOWLEDGMENT: ASCE Journal of the Construction Division
PURCHASE FROM: ESL Repr. PC, Microfilm

00 080075
TRENDS IN RAILWAY BRIDGE CONSTRUCTION [Tendenzen im Eisenbahnbruckenbau]
Proceeding from a detailed analysis of existing bridges in the German Federal Railway network based on numbers, year built, materials used, clear span, and activated values, the author has worked out the economic importance of the smaller bridges and the development trends, and comes out in favour of deck bridges for the smaller spans since these are simple to design and can be produced in series. The special problems of new railway routes are also discussed. [German]

Siebke, H *Eisenbahntechnische Rundschau* Vol. 23 No. 7/8, July 1974, pp 287-297, 19 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

00 080076
VIADUCTS AND OTHER TRACK STRUCTURES ON THE GERMAN FEDERAL RAILWAY'S NEW LINES [Talbrucken und Fahrbahnaufstanderungen in den Newbaustrecken der Deutschen Bundesbahn]
Some of the technical parameters developed on the basis of existing structures on the German Federal Railways are incorporated in bridges and other construction on new lines now being built. The Railways have called on the construction industry to cooperate in further planning. [German]

Halberstadt, L *Eisenbahntechnische Rundschau* Vol. 23 No. 7/8, July 1974, pp 298-301, 5 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

00 080077
TUNNELLING BELOW THE STUTTGART HBF STATION BUILDINGS FOR THE S-BAHN [Unterfahrung des Empfangsgebaudes Stuttgart Hauptbahnhof durch die S-Bahn. Planung und Ausfuhrung]
The authors describe foundation and underpinning work in connection with tunnel construction below the Stuttgart Hbf station buildings for the new rapid transit system (S-Bahn) without interfering with pedestrian movement. [German]

Bubel, H Ellwanger, G *Eisenbahntechnische Rundschau* Vol. 23 No. 7/8, July 1974, pp 274-281, 11 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

00 080081
THE S-BAHN OVERPASS AT FRANKFURT (MAIN) WEST [Das S-Bahn-Uberfuhrungsbauwerk im Bahnhof Frankfurt (Main) West]
A long crossing structure next to and between the running lines is required for an independent routing of the S-Bahn in Frankfurt (Main) West station. The Author explains the choice of a prestressed-concrete bridge structure and deals in particular with the compensation of unequal sinkages. [German]

Prommersberger, G *Eisenbahntechnische Rundschau* Vol. 23 No. 9, Sept. 1974, pp 354-365, 13 Fig., 1 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

00 080092
DEVELOPMENT OF "BALLAST-MAT"
To realize the commercial operation of 250 km/h on the Shin-Kansen network, the "Ballast-mat" which gives more elasticity to the track on elevated structures or tunnels was developed. The process of the development is here introduced through the construction of the ballast-mat, a field test, vibrogir tests, a follow-up examination and material tests in a laboratory. During the process, it became clear that the ballast-mat greatly contributes to the reduction of the cost for track maintenance, the prevention of the pulverization of ballast and the suppression of noise and vibration.

Satoh, Y Usami, T Satoh, Y *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 125-130, 8 Fig., 4 Tab., 2 Ref.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

00 080093
STUDY ON EMBANKMENT FOR CONCRETE SLAB TRACK UPON FLEXIBLE PAVEMENT—REINFORCED EMBANKMENT WITH NET
To construct concrete slab track and assure minimum maintenance, it is necessary to have a densely compacted embankment, taking into account the specific nature of the fill material and the structure. An embankment reinforced with nets of polyethylene has been developed to achieve this. The nets are laid horizontally at 20-cm intervals throughout the fill slope shoulders. The tensile strength of the net allows the heavy compacting vehicle to transverse the shoulder of each layer of the fill safely. Tests showed the embankment was compacted densely throughout—even at the slope surface.

Uezawa, H Nasu, M Komine, T Yasuda, Y *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 121-124, 6 Fig., 2 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

00 080103
SOIL STABILIZATION. LIME USED FOR SOIL STABILIZATION
The stabilization of soils with lime has been extended to a broad range of projects including highways, airports, railways and building sites and its use is growing rapidly. Since quicklime is more dangerous to workmen and therefore more difficult to work with, hydrated lime is commonly used to modify lime-grained soils by the addition of three to eight percent lime by weight. When added to plastic soils, lime generally reduces the plasticity and increases the friability thus improving workability. Lime treatment also reduces both expansion and shrinkage of swelling soils and tends to form a barrier to keep excess water from reaching untreated subsoils. Lime stabilization also increases the strength of soils. Lime requirements and methods of applications are given.

This article is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", Sept. 1974, #072794.

Ireland, HO (Illinois University, Urbana) *AREA Bulletin* Vol. N No. 28, June 1970, pp 846-855, 8 Fig., 1 Tab., 8 Ref.

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: ESL Repr. PC, Microfilm

00 080104
DRILL-LIME TREATMENT OF SHALLOW RAILWAY SUBGRADE FAILURES IN EXPANSIVE CLAYS
This report deals with a method of stabilizing roadbed by applying hydrated lime to holes drilled in the subgrade which Southern Railway has been utilizing. With some 80 locations treated, the results after a few

months were encouraging. While it is too soon to evaluate permanent results, it appears that the drill-lime application may offer relief to areas having the following combination of features: 1) Expansive clays responding to lime treatment; 2) Track areas having shallow ballast sections; and 3) Shallow subgrade failures.

This article is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", Sept. 1974, #072794.

Farris, JB (Southern Railway System) *AREA Bulletin* No. 626, Feb. 1970, pp 574-579, 5 Fig.

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: ESL Repr. PC, Microfilm

00 080106
ICG GOES TO GLU-LAM STRINGERS FOR ITS 1974 BRIDGE PROGRAM
In 1968 Illinois Central Gulf began using prestressed concrete caps in trestles. The road is now making extensive use of glu-lam stringers in its bridge-construction program. A total of 3,050 such stringers was ordered in 1974. Behind both of these changes is the difficulty of obtaining large "sticks" of timber for stringers and caps. The glu-lam stringers used are essentially the same size as the solid-sawn timbers. Although their cost is presently somewhat higher than solid-sawn material, it is believed it will be possible with increasing usage to close the cost gap between the two types.

Railway Track and Structures Vol. 70 No. 12, Dec. 1974, pp 18-20

PURCHASE FROM: XUM Repr. PC

00 080290
EXAMINATION OF BRIDGE EYEBARS
Four carbon steel eyebars taken from two bridges have been examined at the AAR Technical Center. Metallurgical examination and testing was performed on specimens prepared from these eyebars to study the properties and fracture behavior in both a corrosive and non-corrosive environment. Experimental results were compared to the findings of the National Transportation Safety Board's report on the collapse of the Point Pleasant, West Virginia bridge. The findings for the eyebars studies indicate that they were less susceptible to failure because: 1. Higher fracture toughness in the bars investigated. 2. Insignificant effect of a corrosive environment in accelerating the growth of a flaw leading to failure. Therefore, the results indicated that eyebar bridges constructed prior to the use of heat treated eyebars (before 1920), are less likely to develop a non-detectable eyebar crack leading to failure than those bridges where heat treated eyebars were used.

Stone, DH Shearer, MP
Association of American Railroads Research Center, (R-022) Mat Survey R-151, Dec. 1973, 43 pp, 21 Fig., 9 Tab., 3 Ref., 1 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

00 080302
CULVERT JACKED BENEATH RAILROAD AND HIGHWAY TO AVOID DISRUPTING TRAFFIC
To avoid disruption of the trunk line of the South African Railways through Durban, a contractor jacked sections of a 26-foot wide box-shaped concrete culvert through the railroad embankment and three highway ramps. This 525-foot storm water culvert is to drain sections of the eight-track rail line and a park which often are inundated by heavy rains. A jacking project of these dimensions had never been attempted in Africa before. Among the problems were the presence of groundwater since the culvert is in sandy clay about a foot below sea level and its top is only about 2 feet below the track. It was also necessary to stabilize unconsolidated earth at one point in the operation.

Engineering News-Record Vol. 193 No. 23, Nov. 1974, p 20

PURCHASE FROM: ESL Repr. PC, Microfilm

00 080304
A TALE OF THREE TUNNELS
This article describes "available techniques" adapted to resolving the unique problems associated with construction of three submerged underwater tunnels, each of which was confronted with a different problem. The projects are the steel-shell tube of the Hong Kong vehicular tunnel, the trench method used for the four-track tunnel of the Metropolitan Transportation Authority under the East River in New York City, and the second Hampton Roads Tunnel in Virginia which required a system of surcharged sand drains.

Kuesel, TR (Parsons, Brinckerhoff, Quade and Douglas, Inc) *ASCE Civil Engineering* Vol. 44 No. 12, Dec. 1974, pp 50-53, 4 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 080347
MULTI-PRONGED SUBWAY WORK ADVANCES WITHOUT TRAFFIC TIEUP
This article describes how prefabricated steel shoring grids and specially built bridging panels speed construction of subway facilities beneath busy San Francisco streets without seriously disrupting traffic overhead.

Drossel, MR (McGraw-Hill World News) *Construction Methods and Equipment* Vol. 56 No. 10, Oct. 1974, pp 70-72

ACKNOWLEDGMENT: EI (EI 74 080390)
PURCHASE FROM: ESL Repr. PC, Microfilm

00 080356
ON THE SANTA FE EPOXIES RESTORE CRACKED CONCRETE
Defects are sealed with epoxy paste and bonding formation is pumped into voids. Test cores are made before the work is done and also afterward to confirm penetration, filing of cracks.

Railway Track and Structures Vol. 70 No. 9, Sept. 1974, pp 40-42

ACKNOWLEDGMENT: EI (EI 74 080393)
PURCHASE FROM: ESL Repr. PC, Microfilm

00 080364
DESIGN AND CONSTRUCTION OF COMBINED RAIL AND ROAD BRIDGES OVER MISSION RIVER AT WEIPA, NORTH QUEENSLAND
The Mission River and Andoom Creek Bridges, total length 4206 ft, form part of the road-railway complex being constructed by Commonwealth Aluminum Corporation Pty Ltd at Weipa in North Queensland. The investigation and design of these bridges are outlined in this paper, and aspects of construction are discussed briefly.

Adcock, H (Gutteridge, Haskins & Davey Propriety Limited) *Institution of Engineers (Australia) Civ Eng Trans* Vol. CE15 No. 1&2, Paper No. 3128, 1973, pp 21-26, 5 Fig., 2 Tab., 8 Ref.

ACKNOWLEDGMENT: Institution of Engineers (Australia) Civ Eng Trans
PURCHASE FROM: ESL Repr. PC, Microfilm

00 080365
GREENVALE RAILWAY—FEASIBILITY STUDY AND DESIGN
The paper describes the Feasibility Study undertaken and the subsequent Survey, Investigation, and Design of a 143-mile railway being constructed as part of the Greenvale Nickel Project in Northern Australia. The method of performing the various activities associated with the Study and Design are outlined, as well as the major constraints influencing these operations. Design parameters established for the various parts are scheduled together with comparative estimates of cost and quantities for the Feasibility Study and Design. The restricted time programme for completing each activity is highlighted, together with the need for close co-operation and interaction between the various disciplines to ensure the project was completed on schedule.

Rivett, JC Adcock, H (Gutteridge, Haskins & Davey Propriety Limited) *Institution of Engineers (Australia) Civ Eng Trans* Vol. CE15 No. 1&2, Paper No. 3257, 1973, pp 27-35, 7 Fig., 3 Tab., 2 Phot., 7 Ref., 1 App.

ACKNOWLEDGMENT: Institution of Engineers (Australia) Civ Eng Trans
PURCHASE FROM: ESL Repr. PC, Microfilm

00 080425
AERODYNAMIC NEAR FIELD OF A SUBWAY TRAIN IN SMOOTH AND ROUGH TUNNELS
The report has been prepared under Transit Development Corporation project, 'Ventilation and Environmental Control in Subway Rapid Transit Systems,' and is one of many such reports leading to the final product—a

subway environmental design handbook. A theoretical model for the near field aerodynamics of a subway train in smooth and ribbed tunnels has been developed. The theoretical results have been compared with experimental data measured in a number of different facilities over a wide range of experimental conditions.

Harris, GL
Transit Development Corporation, Incorporated, Urban Mass Transportation Administration Tech. Rpt. Jan. 1973, 34 pp

Grant DOT-UT-290

ACKNOWLEDGMENT: NTIS (PB-237364/5SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-237364/5SL, DOTL NTIS

00 080460
NEW BRIDGE CONSTRUCTION METHOD FOR SA

A bridge construction method being used for the first time in South Africa, which requires 23 concrete beams weighing a total of 13,800 t to be thrust as a single unit across a distance of more than a kilometre, is being used to span the Olifants River valley, near Vredendal, on the Sishen-Saldanha railway line.

Railway Engineering Vol. 148 No. 5, Sept. 1974, pp 10-11, 2 Phot.

ACKNOWLEDGMENT: Railway Engineering
PURCHASE FROM: Thomson Publications SA (Pty) Limited P.O. Box 8308, Johannesburg, South Africa Repr. PC

00 080782
CONCRETE FOR TUNNEL LINERS: EVALUATION OF FIBER REINFORCED QUICK SETTING CONCRETE

This study was undertaken to determine the behavior of steel fiber reinforced, quick setting cement concretes and provide information on this material needed for its application in tunnel liners. Strength-time and creep behavior are evaluated for specific mix designs. The creep behavior does not appear to be substantially different than for plain concrete. Interaction diagrams are presented for concretes made with Duracal cement and fiber contents of 0.9, 1.2 and 1.5 percent by volume. Various failure modes were obtained depending on the initial relative eccentricity of load. Tensile stress-strain relationships are analytically obtained from flexural test data. These relationships make possible a post-crack analysis of a fiber reinforced concrete structure. Fiber content, fiber orientation, and type of cement have little effect on Poisson's ratio but do influence the modulus of elasticity and the strength. Durability of these concretes is examined through study of permeability, leaching, volume stability, disturbance of young concrete, effects of high temperature environments and sulfate resistance. Pumping of fibrous concrete is investigated through laboratory testing. The presence of fibrous reinforcement significantly increases the volume of voids making the aggregate gradation and cement paste content critical parameters in designing pumpable mixes.

This document was prepared for the Federal Railroad Administration, DOT.

Halvorsen, GT Herring, KS Keske, WG Ounanian, DW Spalding, AV Kesler, CE
Illinois University, Urbana, (UILU-ENG-74-2024) Final Rpt. FRA-ORDD-75-3, Aug. 1974, 104 pp

Contract DOT-FR-30022

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236995, DOTL NTIS

00 080783
CONCRETE FOR TUNNEL LINERS: BEHAVIOR OF STEEL FIBER REINFORCED CONCRETE UNDER COMBINED LOADS

This study was undertaken to determine the behavior of a steel fiber reinforced concrete member subjected to combined compressive and flexural loads. In addition, information was obtained on the tensile stress-strain relationship, the modulus of elasticity in compression, and Poisson's ratio. Interaction diagrams are presented for concretes made with two quick setting cements and fiber contents of 0.9, 1.2 and 1.5 percent by volume. Compressive failures, tensile failure, and simultaneous compressive- tensile failures were obtained depending on the moment to axial load ratio. A method is presented for determining the tensile stress-strain relationship for a length of beam immediately surrounding a crack. This tensile stress-strain relationship makes possible a computerized post-crack analysis of fiber reinforced concrete structures. Fiber content, fiber orientation, and type of cement appear to have little effect on Poisson's ratio but do influence the modulus of elasticity and the strength.

This document was prepared for the Federal Railroad Administration, DOT.

Herring, KS Laws, JW Kesler, CE Paul, SL Robinson, AR
Illinois University, Urbana, (UILU-ENG-74-2025) Final Rpt. FRA-ORDD-75-7, Aug. 1974, 80 pp

Contract DOT-FR-30022

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236276, DOTL NTIS

00 080784
PERFORMANCE AND NOISE SUPPRESSION TESTS OF A WATER CANNON

Additional laboratory tests were conducted with a high pressure water cannon which had previously been developed for rock tunneling experiments. Pulsed jets were fired against copper samples to correlate crater volume with input energy. Research was conducted to devise a method for measuring the water jet velocity when air at atmospheric pressure was used in the exponential nozzle prior to firing. The nozzle design was modified in order to provide improved performance when air is used instead of vacuum in the nozzle. However reliable measurements of jet velocity were not obtained with air in the nozzle because of experimental difficulties. Therefore it was not possible to determine the effect of the nozzle modification or of the initial nozzle air pressure on nozzle performance. An improved jet noise suppressor was tested in shots against 2 ft. cubes of Barre granite. Peak noise intensity was reduced to 124 DB at 26 ft. (8 m) range.

This document was prepared for the Federal Railroad Administration, DOT.

Cooley, WC
Terraspace Incorporated Final Rpt. FRA-ORD&D-75-9, Sept. 1974, 32 pp

Contract DOT-FR-20042

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-238359, DOTL NTIS

00 080971
TUNNEL BORING MACHINES—A MEANS TO RAILWAY LINE IMPROVEMENT

This paper describes tunnel boring machines used extensively in Europe for improving railway routes by shortening them and reducing grades. Mention is made of the proposed tunnel beneath the English Channel for a double-track railway line. Some suggested improvements in tunnel equipment are described which are expected to improve productivity of the machines.

MacNabb, TC (Canadian Pacific) *AREA Bulletin* Vol. 75 Bulletin No. 648, June 1974, pp 779-796, 18 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 080972
BURLINGTON NORTHERN LINE CHANGE WINS BRIDGE AWARDS

In the course of consolidating the properties of its three predecessor railroads at Spokane, Washington, the Burlington Northern undertook an $18.8 million project which involved the building of a 4,000-foot steel box girder bridge 200 feet above a stream, the building of a 5.5-mile line change, and the construction or major alteration of 11 other bridges. The planning and implementation of this project are described.

Anderson, BG Ekrem, NE (Burlington Northern) *AREA Bulletin* Vol. 75 Bulletin No. 648, June 1974, pp 756-766, 6 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 081206
FOCUSSED LASER BEAMS TO ASSIST ROCK EXCAVATION
A study was performed to assess the feasibility of using a focused CO2 laser beam to cut the gage of a hard-rock tunnel being excavated by a continuous tunnel-boring machine. Laser rock-kerfing tests were conducted on isolated samples of granite, diabase and quartzite rock with a Navy-owned electric-discharge CO2 laser located at the United Aircraft Research Laboratories. The tests were performed to verify previously made extrapolations which were used to predict full-scale power requirements for the laser gage-kerfing concept. Laser powers and kerfing speeds were extended from previously tested maximum values of 5 kW and 21.2 cm/sec to 16.5 kw and 125 cm/sec. In addition, the test program included a comparison of the use of 50.8 cm-focal-length spherical and cylindrical focusing mirrors. Concurrently with the laser kerfing tests, a thermal-mechanical rock stress analysis of the combined laser-kerf and mechanical-cutter load was performed. The temperature field adjacent to a laser kerf was predicted from an analytical model which was verified with temperature measurements recorded during the kerfing process by thermocouples imbedded in the tested rock samples. Stresses from the combined load were determined by using a finite-element computer program. Furthermore, rock samples were subjected to the combined load to assess fracture conditions. Concentrated surface loads were applied adjacent to laser and saw-cut kerfs on blocks of granite to test the hypothesis that substantial rock-weakening occurs due to laser kerfing. With the new test data, a revised gage-cutting cost comparison consider- ing the use of both laser gage-kerfing and rolling mechanical gage-cutters was undertaken. Finally, several novel full-face laser excavation concepts that have potential for increasing hard-rock excavation rates were considered in a preliminary way.

Jurewicz, BR Greenwald, LE Brown, CO
United Aircraft Corporation, (N-9715-43-11) Final Rpt. FRA-ORD&D-75-20, Nov. 1974, 166 pp, 80 Fig., 4 Tab.

Contract DOT-FR-20021

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
FRA-ORD&D-75-20, DOTL NTIS

00 081209
SOIL MECHANICS
This collection of seven reports is of interest to soils engineers and designers concerned with pipes and culverts, with reinforced earth and with bearing capacities. In addition to papers on pavement design, there is presented the analysis of large-scale field studies of flexible pipe culverts that led to a recommendation that a ring compression method with a higher factor of safety be adopted for future construction. The paper on reinforced earth embankments is based on Rankine's state-of-stress theory and a new strain energy principle. A method for determining the critical bearing capacity of a footing on saturated, undrained clay is discussed. A new solution to the deformational behavior of beams on nonhomogenous bases concludes the series of reports.

Transportation Research Record No. 510, 1974, 92 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Repr. PC

00 081261
GLUED-LAMINATED BRIDGES GAIN IN CANADA
Some brief details about these bridges which consist of a deck-girder span embodying four glued-laminated girders. The first glued-laminated road bridge was built in 1951. There now exist some 300 such bridges. Spans can exceed 30 metres. The Cale Creek bridge even has large-sized glued-laminated tower bents 16 m high. The advantage of such bridges is their low cost, 4-50 year useful life virtually without maintenance, their easy installation, the possibility of dismantling them for use elsewhere and the delivery on site of the materials within 3 to 6 weeks of ordering.

This article is also available from Xerox University Microfilms, 300 North Zeeb Road, Ann Arbor, Michigan, 48106, at $3.00 per copy.

Railway Track and Structures Vol. 70 No. 6, June 1974, pp 29-30, Figs.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1147)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

00 081266
THE LONGEST AFRICAN RAILWAY LINE UNDER CONSTRUCTION THE "TANZAM" [La plus grande voie ferree africaine en construction, le "TANZAM"]
The rail link between Tanzania and Zambia, called the "TANZAM", connecting the port of Dar-es-Salaam on the Indian Ocean to Kapiri M'Poshi on the Zambesi is mainly intended for exporting mine production and working the copper deposits in Northern Zambia. Of a total of 1,857 km of single track, 1,067 m gauge line, 660 km are already commercially operative. The line, which is designed for 18 t axle-loads, will be worked by diesel-electric traction throughout. Various political, economic and financial problems have put back building operations, but now that the most difficult section rising to 1,646 m is completed, work is proceeding rapidly towards Zambia. [French]

La Vie du Rail Outremer No. 237, Mar. 1974, pp 9-13, 10 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 819)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

00 081629
ITALIAN RAIL LINE BUILT OVER, ON AND BELOW GROUND
The 173-mile high-speed line of the Italian State Railways between Rome and Florence involves construction of three major tunnels—6.8, 6.3 and 3.5 miles long. The two longer tunnels are being dug with U.S. tunneling machines. The initial 76-mile segment of this electrified line, which ultimately will have four tracks, is scheduled to open in the Spring of 1975. Meanwhile the nation's economic problems may force cancellation of rail construction projects other than the $2.5 billion Direttissiam which is projects other than the $2.5 billion Direttissima which is

Engineering News-Record Vol. 194 No. 1, Jan. 1975, pp 24-25, 3 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

00 081630
NONDESTRUCTIVE METHODS OF FATIGUE CRACK DETECTION IN STEEL BRIDGE MEMBERS
Some of the thousands of steel bridges in the nation's transportation systems will experience fatigue damage as they are subject to accumulations of loading cycles. Such cracks need to be detected and repaired on a routine basis. This study summarizes the state-of-the-art in nondestructive inspection methods and evaluates their reliability and adaptability for the detection of fatigue cracks in welded highway bridges. Reviewed and compared are the following methods: X-ray examination, ultrasonic examination, dye-penetrant examination, magnetic particle examination, and eddy current examination. While all will detect cracks, the study rates ultrasonics as the method best suited for field use.

NCHRP Research Results Digest #66, Jan. 1975, 14 pp, 10 Ref.

PURCHASE FROM: TRB Repr. PC

01 051934
ASSESSMENT OF DESIGN TOOLS AND CRITERIA FOR URBAN RAIL TRACK STRUCTURES. VOL 2. AT GRADE SLAB TRACK
The development of techniques and criteria for track design is an important part of the Rail Supporting Technology Program that is being managed for the Urban Mass Transportation Administration by the Transportation Systems Center (TSC). This report presents the results of a critical review of the technical factors which govern the design and performance of at-grade slab track for urban rail systems. The assessment of current design practice is based on a review of the literature and discussions with experienced track design personnel. The evaluation includes descriptions of slab structures now in use in four countries, followed by review of design and analysis procedures used to characterize the subgrade and its support characteristics; the reinforced concrete slab itself, and the subgrade-support system. With a few exceptions, most of the work reported in the literature is based on highway or runway applications, where the mechanism of load transfer into the slab is completely different than in a rail support slab. Further research on the mechanisms of load transfer from rail fasteners into a reinforced concrete slab is needed, and the newly developed finite element approach appears well-suited. Continued study of settlement and failure criteria is needed for soil and base materials subjected to cyclic loading. The relative merits of various types of reinforced concrete slabs for example, pre-stress or post-stress considerations and joints are recommended for further study.
See also Volume 1, NTIS #PB-233017. RRIS #057884.

Meacham, HC Prause, RH Waddell, J
Battelle Columbus Laboratories, (DOT-TSC-UMTA-74-5) Final Rpt. UMTA-MA-06-0025-74-4, Apr. 1974, 90 pp

Contract DOT-TSC-563

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-233017, DOTL NTIS

01 052533
BEHAVIOR OF THE METAL OF RAILS AND WHEELS IN THE CONTACT ZONE. EXPERIMENTAL STUDIES: 1) WORK-HARDENING SPEED WITH THE EMS 60 MACHINE (ADDITIONAL MEASUREMENTS), 2) RESIDUAL STRESSES IN HARD-GRADE STEEL RAILS (ADDITIONAL MEASUREMENTS) 3) CHECKING OF FATIGUE CRITERION PROPOSED BY MR. DANG VAN
This report is in three parts: 1) Work-hardening speed examined with the EMS 60 machine: The development of the two principal residual stresses produced on the running surface of rails made of different grades of steel has been studied as a function of the repeated passages of a loaded wheel. It has been shown that this development ceases at about approximately 1 million cycles. 2) Residual stresses in hard-grade steel: These stresses have been measured inside 2 rails of hard-grade steel, one new and the other work-hardened in service. The use of the rail in the track produces severe longitudinal and transverse compressive stresses at the surface. The stress field is affected strongly throughout the height of the rail-head. 3) Checking of fatigue criterion proposed by Mr. Dang Van: The fatigue limits of a rail steel have been determined for different cases of stressing. The results have enabled the validity of the fatigue criterion proposed by Mr. Dang Van (see Report C 53/RP 7) to be confirmed.

International Union of Railways C53/RP 8/E, Oct. 1973, 31 pp, Figs., 2 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

01 052548
OPTIMUM ADAPTATION OF THE CONVENTIONAL TRACK TO FUTURE TRAFFIC. STUDY OF THE CHANGE IN THE TRACK LEVEL AS A FUNCTION OF THE TRAFFIC AND OF THE TRACK COMPONENTS (FIRST RESULTS OF LABORATORY AND SITE TESTS)
The report deals with the change in the longitudinal level of conventional tracks under the effect of operating loads. Tests have been carried out in the laboratory and on actual sites on differently equipped tracks, with a view to defining the influence of the various track component parameters. The discovered evolution law of defects has shown that the reduction in sleeper spacing and of crib and shoulder consolidation exert a rather clear influence. It has also become apparent that the quality of the maintenance operations exerts a very large influence. These findings should however be treated with caution. The influence of the inertia of the rail, the thickness of the rail pads, the types of sleepers and the conditions of the formation and of the ballast, will be accurately defined later.

International Union of Railways B117/RP 2/E, Apr. 1973, 54 pp, Figs., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

01 052555
BEHAVIOUR OF THE METAL OF RAILS AND WHEELS IN THE CONTACT ZONE. CALCULATION OF THE COMPLEX STRESS CYCLES IN THE RAIL SUBJECTED TO ROLLING LOADS. ASSESSEMENT OF THE DANGER OF DAMAGE (CONTINUED)
This study deals with new calculations of the composition of the residual stresses and the stresses induced in the rail during the passage of wheels, for different loading values, wheel diameters and wheel-tyre transverse curvatures. One thermal stress and three residual stresses have been considered. The latter have been calcuated and then measured with the help of an original strain-gauge method. The danger of rail damage has then been evaluated by means of the damage line criterion proposed by Mr. Dang Van (see C 53/RP 7 and C 53/RP 8). It has been possible in this way to define the danger factor for each loading case. It has been shown that two types of danger exist, namely, fatigue and plastic deformation.

International Union of Railways C53/RP 9/E, Oct. 1973, 27 pp, 26 Fig., 5 Tab., 2 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

01 052564
TEST TRACK AT RADCLIFFE-ON-TRENT. CONSTRUCTION AND RUNNING EXPERIENCE
This description of experience with various types of ballastless track using in situ concrete slab indicates some of the practical aspects of installation and the standards of accuracy obtained. Most of the test lengths have shown no significant deterioration in four years of service carrying normal traffic.

International Union of Railways D87/RP 7/E, Oct. 1973, 18 pp, 7 Fig., 12 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

01 052596
PREVENTION OF DERAILMENT OF GOODS WAGONS ON DISTORTED TRACKS. ENQUIRY ON THE DISTRIBUTION OF TRACK TWISTS FOR BASE LENGTHS OF 1.80 TO 19.80 M
The determination of the maximum permissible torsional rigidity ensuring the rolling safety of a vehicle the wheelsets of which are exposed to guiding forces, requires knowledge of the magnitude of the track twists which this vehicle may encounter. These track twist values depend on the wheelbase of the vehicle. The results of the first inquiry of the Committee on the distribution of track twists, presented in the ORE Report B 55/RP 2, relate only to track twists referred to as a base of 5 m. They cannot be extrapolated to other base lengths. A new enquiry was therefore carried out, the results of which cover the wheelbase range from 1.80 to 19.80 m. The statistical analysis of the measured values has made it possible to define a formula for calculating, for a chosen probability level, the track twists likely to be encountered depending on the track category and the base length. Taking into account the measured values and the statistical analysis of these measurements on the one hand and, on the other, the limit values of the nominal track twists in transition curves, which differ from one Administration to another, formulae are established to determine, on behalf of the vehicle designs, the permissible limit twists g SUB lim in function of the base b = 2a.

International Union of Railways B55/RP 5/E, Oct. 1973, 29 pp, 61 Fig., 19 Tabs., 5 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

01 052597
STANDARDIZATION OF POINTS AND CROSSINGS. DIVERGING TURNOUTS FOR SPEEDS OF 100 TO 200 KM/H AND ABOVE—GENERAL DESIGN—EXPERIENCE ACQUIRED BY CERTAIN ADMINISTRATIONS
This report gives a summary of the experiences already gained by the Railway Administrations in the matter of switches and crossings for speeds between 100 and 160 km/h on the diverging route. To begin with are discussed the general characteristics of the guide lines within which the figures indicated are based essentially on the conclusions of Committee D 72. The trials already carried out and those yet to be undertaken should permit the establishment of the essential parameters; acceptable cant deficiency, form of transition, design of switch toe, slope of entry for check rails ets. Bordering on these trials of turnouts of standard design, which embrace the range of speed up to 220 km/h on the divergind route, the trials with movable nose crossings intended to eliminate gaps in the running lines, are equally provided for.

International Union of Railways D121/RP 1/E, Apr. 1974, 16 pp, 20 Fig., 3 Tab., 9 Ref., 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

01 057441
IMPROVEMENT OF THE TECHNOLOGY AND MECHANIZATION OF TRACK-LAYING WORKS AT OPEN PIT MINES [Sovershenstvovanie tekhnologii i mekhanizatsii putevykh rabot na rar'erakh]
Results of industrial tests of new track-laying machines are presented and the savings due to their use at the Sokolovsko-Sarbayskiy iron ore mining and dressing combine in Kazakhstan are described. These machines include some that are based on caterpillar and wheel tractors as well as a tie-placing machine based on combined automobile and rail drive. [Russian]

Putyatin, BK Podsosov, AL Yakimov, IT Tleugabylov, ZK Kim, VS *Gornyi Zhurnal* No. 1, Jan. 1974

ACKNOWLEDGMENT: EI (EI 74 600137)
PURCHASE FROM: ESL Repr PC, Microfilm

01 057450
BALLASTED TRACK FOR HIGH SPEEDS [Schotteroberbau Fuer Hohe Geschwindigkeiten]
The Author discusses the problems of ballasted track for high speeds and the possible improvement of track, ballast and formation to this end. Among other things, he states the view that under certain operating conditions the classical permanent way would then be economically viable up to speeds of 250 to 300 km/h. [German]

Eisenmann, J (Munich Technical University) *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 38-43, Figs., 16 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

01 057454
ON THE STABILIZATION OF THE BALLAST BED [Ein Beitrag zur Stabilisierung des Schotterbettes]
An investigation was made, as part of a dissertation, into whether the addition of smaller-size ballast increases the deformation resistance of the ballast bed. Greatest success and reduced maintenance costs appear to be promised by adding 15 percent smaller ballast to the grade 1 size. [German]

Profanter, HH *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 52-54, Figs., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

01 057456
THE TECHNICAL PLANNING FOR NEW LINES OF THE GERMAN FEDERAL RAILWAY [Die Technische Planung der Neubaustrecken der Deutschen Bundesbahn]
The Author describes the present stage of the German Federal Railway's planning for new lines in the near and distant future, also the elements of track layout, structure gauge, track spacing and the standard cross-section considerations. Reference is also made to the awaited results of the various studies and the decisions which will follow. [German]

Wolf, W (German Federal Railway) *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 14-21, Figs., 1 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

01 057459
SWITCH DESIGNS WITH UIC 60 RAILS IN THE GERMAN FEDERAL RAILWAY [Weichen mit Schienen UIC 60 bei der Deutschen Bundesbahn]
A series of new switch designs using UIC 60 rails are being developed to meet the requirements of high speed and high loading. Described here are the more important of the changes, such as the altered switch geometry, longer tongue rails, new check rails with rigid crossings and crossings with movable tips without check rails. [German]

Morgenschweis, O *Eisenbahntechnische Rundschau* Vol. 23 No. 3, Mar. 1974, pp 97-104

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

01 057462
INVESTIGATIONS ON THE FORM STABILITY OF RAILS AND CONCLUSIONS FOR THE PRACTICE [Untersuchung zur Gestaltfestigkeit der Schienen und Folgerungen fur die Praxis]
Investigations were made into the effects of tensile strength and steel qualities on the form stability of rails when subjected to flexural or bending stress, also the part played by the condition of the rail surface. The results showed that there was a danger of fatigue with the S 49 rail on main lines, with the result that the UIC 60 was recommended. [German]

Eisenmann, J Oberweiler, G (Munich Technical University); Schweitzer, R Heller, H (Krupp Huttenwerke AG) *Eisenbahntechnische Rundschau* Vol. 23 No. 3, Mar. 1974, pp 122-126, Figs., 6 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

01 057489
MOBILE SAFETY PATROL
The Reading Railroad has begun a pilot project to handle minor maintenance problems before they become a major safety hazard. A mobile unit is sent to areas where complaints have been made. In addition to maintenance, the safety unit also checks for hazards, such as broken rails, and reports these cases to appropriate departments.

Progressive Railroading Vol. 17 No. 3, Mar. 1974, pp 40

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

01 057500
THE USE OF HEAVY MACHINERY FOR TRACK MAINTENANCE
Mechanisation of track maintenance with heavy machinery enables the following operations to be carried out mechanically: longitudinal and transverse levelling of the track; realignment of the track; levelling of the ballast. To these operations we must now add the tamping of the spaces between sleepers, in the case of long welded track. This mechanisation, which began with track levelling followed by realignment, has now reached a level of quality superior to the similar operation carried out manually. In addition, particularly in countries where labour is expensive, this mechanisation enables track maintenance costs to be reduced.

Gunst, G *Rail International* No. 2, Feb. 1974, pp 177-187, Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

01 057514
OBB TRIES OUT LUGGED SLEEPERS ON SMALL RADIUS CURVES
Because of problems of transverse displacement and buckling, Austrian Federal Railways (OBB), like most other European railways, limits the installation of continuously-welded rail on concrete sleepers to curved track with a radius of not less than 450 m. In Austria, however, this limitation affects between 30 and 40 per cent of OBB's mileage and there is economic pressure to solve these problems so that the advantages of long-welded rail can be extended to routes with curves of smaller radius. OBB has therefore developed two new monobloc concrete sleepers with this in mind.

Railway Gazette International Vol. 130 No. 6, June 1974, pp 239-241

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

01 057515
CLOSING THE GAP AT THE FROG
Swing-nose or swing-wing turnouts, designed to provide an uninterrupted path for wheel treads, have been installed experimentally by a number of European administrations, and their advantages in cutting down both horizontal and vertical impacts are likely to be more widely appreciated as speeds rise.

Railway Gazette International Vol. 130 No. 6, June 1974, p 239

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

01 057517
WAGR COMPLETES ITS GAUGE CONVERSION PROJECT
This year will see the completion, after 12 years, of Australia's biggest gauge conversion project. Whereas WAGR's 3 ft 6 in gauge section of the east-west transcontinental main line was replaced by standard gauge on a new alignment, the branches from Kalgoorlie to Leonora and Esperance are being converted at minimum cost using secondhand materials.

Holm, AB *Railway Gazette International* Vol. 130 No. 6, June 1974, pp 224-226, 5 Phot.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

01 057558
C&NW'S 4 POINT RAIL-MAINTENANCE PROGRAM IN JOINTED TERRITORY
To counter effects of heavy traffic C&NW has stepped up its efforts to improve conditions at rail joints. Maintenance operations include surface grinding, bolt tightening, joint-straightening and building up battered joints.

Railway Track and Structures Vol. 70 N July 1974, pp 14-16, 1 Fig., 5 Phot.

ACKNOWLEDGMENT: Railway Track and Structures
PURCHASE FROM: XUM Repr. PC

01 057559
KANSAS CITY SOUTHERN MAKES TIE RENEWALS WITH SMALL MACHINE
To an increasing extent, tie renewals are being made on the Kansas City Southern with a relatively small machine, known as the Section Gang Machine, which can be moved to and from the track by a few men. The number of attachments designed to increase the versatility now include the tie renewer, spike hammer, spike puller, lag screw bolter, tie drill and concrete breaker. Ease of handling, versatility of attachments and convenience of transporting it give the Section Gang Machine a good performance rating by KCS.

Railway Track and Structures Vol. 70 N July 1974, pp 22-24, 4 Phot.

ACKNOWLEDGMENT: Railway Track and Structures
PURCHASE FROM: XUM Repr. PC

01 057674
DOT TEST TRAIN PROGRAM SYSTEM INSTRUMENTATION MANUAL. FOURTH EDITION
This report describes current instrumentation installed aboard the Federal Railroad Administration Test Cars. The instrumentation is designed to gather research data on various rail research projects. The major discussion in this report covers the Track Geometry System aboard the test train, and the operation and calibration of this system.
See also RRIS #039279, PB 209709 and RRIS #039265, PB 203110.

Anderson, L Kolczynski, N
ENSCO, Incorporated Annual Rpt DOT-FR-72-21, Dec. 1972, 194 pp, Figs.

Contract DOT-FR-20032

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

01 057716
RECIPE FOR REHABILITATION
Two articles discuss the problems of bad track and deferred maintenance and some possible solutions. Because of the bad track some people are suggesting that the government take over the track to maintain it and let the companies pay a user fee to operate over the rails. The Transportation Act of 1974 would provide loans that could be used for track maintenance. CONRAIL is another proposed solution to the problems. New equipment is making maintenance-of-way work faster and cheaper but problems are developing with material shortages, especially ties.

Myers, ET *Modern Railroads* Vol. 29 No. 7, July 1974, pp 40-44

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

01 057819
TRACK GEOMETRY DEVELOPMENT UMTA URBAN RAIL SUPPORTING TECHNOLOGY PROGRAM
Measurement of transit system track geometry parameters, under normal operating conditions, is essential for planning and conducting an effective maintenance program. The pertinent parameters are profile, gage, alignment, and cross level. Present methods of determining track conditions are inefficient and highly subjective. Several track geometry measurement methods have been investigated.

Rutyna, FJ
Transportation Systems Center Final Rpt. DOT-TSC-UMTA-73-14, Apr. 1974, 41 pp

Contract UM404/R4731

ACKNOWLEDGMENT: NTIS (PB-233394/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-233394/6, DOTL NTIS

01 057862
RAIL WELDING METHODS
This paper is a review of various kinds of rail welding methods used in Japan. It describes special merits, the present state of utilization and the trend in future of those methods, and it shows various experimental values about the strength of welded rails. Further, it describes a few special rail welding methods other than those for making continuous welded rail such as welding of austenitic manganese steel crossing to carbon steel rail.

Oishibashi, H *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 69-75, Figs.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

01 057871
DEVELOPMENT OF TRACK BALLAST MAT
As a result of tests on the New Tokaido Line, aimed at developing speeds to 250 km/h, the laying of rubber mats under the ballast was conceived. Used automobile tires, ground and heat moulded into mats, have proven effective in preventing the pulverization of the NT Line ballast. The cost

of track maintenance was reduced and noise and vibration suppressed. It has been decided to totally adopt the ballast mat in the tracks of the nationwide Shin Kansen network and it is possible also on the narrow-gauge lines.

Also available through Japan Railway Civil Engineering Association.

Sato, Y Usami, T (Japanese National Railways) *Permanent Way* Vol. 15 No. 3, No. 56, 10 pp

ACKNOWLEDGMENT: Permanent Way
PURCHASE FROM: ESL Repr. PC, Microfilm

01 057874
LAYING OF TRACK BALLAST MATS IN SHINKANSEN
By laying mats of heat-moulded ground automobile tires beneath the ballast as rail is renewed, the Japanese National Railways is reducing maintenance costs sufficiently to justify the mat installation. Noise and vibration are also reduced. It is intended that this system will be standard as the Skin Kansen is extended throughout Japan. Further studies are planned on the durability of the ballast mat, its effects on preventing ballast pulverisation and the maintenance cost reduction.

Also available through Japan Railway Civil Engineering Association.

Tajima, H Kiura, K (Japanese National Railways) *Permanent Way* Vol. 15 No. 3, No. 56, pp 11-20

ACKNOWLEDGMENT: Permanent Way
PURCHASE FROM: ESL Repr. PC, Microfilm

01 057884
ASSESSMENT OF DESIGN TOOLS AND CRITERIA FOR URBAN RAIL TRACK STRUCTURES. VOLUME I. AT-GRADE TIE-BALLAST TRACK
The report presents the results of a critical review of the technical factors which govern the design and performance of at-grade tie-ballast track for urban rail systems. The assessment of current design practice is based on a review of the literature and discussions with experienced track design personnel. The evaluation includes design loads and the criteria for selecting rail size, tie size and spacing, ballast depth, and subgrade parameters. The major track problems identified were rail joints, rail wear and noise on curves, rail fasteners, and rail corrugation. Detailed technical evaluations were made to determine those areas where the track design procedures are inadequate. The report includes detailed information for the engineering design of track and recommendations for both short and long-range program plans for future research pertaining to the improvement of track performance.

See also Volume 2, PB-233017. RRIS #012656.

Prause, RH Meacham, HC
Battelle Columbus Laboratories Final Rpt. Apr. 1974, 247 pp

Contract DOT-TSC-563

ACKNOWLEDGMENT: NTIS (PB-233016/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-233016/5, DOTL NTIS

01 071614
SPECIAL STUDY OF PROPOSED TRACK SAFETY STANDARDS
The report reviews the initial track safety standards proposed by the Federal Railroad Administration in response to the mandate of the Federal Railroad Safety Act of 1970. The report discusses the risks involved in promulgating nonobjective, incompatible, or nonadaptable standards and suggests alternate approaches that may promote effective and enforceable track safety standards. The report recommends that standards not be advanced unless they are objective, compatible with the system, and adaptable to circumstances, including changes in technology. Additional recommendations are directed at methods of strengthening the standards including such items as definitions, and the inclusion of standards for the promotion of safety at grade crossings and reducing the incidence of rail failure.

National Transportation Safety Board NTSB-RSS-71-2, Aug. 1971, 28 pp, Apps.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche

01 071793
CROSSTIE SUPPLY: LIGHT AT THE END OF THE TUNNEL
It is reported that as a result of price increases, plus better weather in producing areas and reduced demand from other users of hardwood, tie production is showing a sharp improvement from recent low levels.

Railway Track and Structures Vol. 70 No. 6, June 1974

ACKNOWLEDGMENT: EI (EI 74 803406)
PURCHASE FROM: ESL Repr PC, Microfilm

01 071810
RAILS FOR HIGHLY STRESSED TRACKS [Schienen fuer Hochbeanspruchte Geleise]
The increasing tonnage and speeds in grade operation, such as on the Gotthard line of the Swiss National Railways impose exacting demands on the quality of the rails. Qualification of Krupp's nominally 0.7C-0.7Si-1Mn-1Cr steel for such service is indicated by its tensile strength of 110 to 125 kp/sq mm, wear and shelling resistance, strain hardening, impact resistance, and weldability. [German]

Heller, W Schumacher, G *Technische Mitteilungen Krupp, Werksberichte* Vol. 32 No. 1, Mar. 1974, pp 21-27, 19 Ref.

ACKNOWLEDGMENT: EI (EI 74 701609)
PURCHASE FROM: ESL Repr PC, Microfilm

01 071817
IT'S 'BIG' IN MANY DIFFERENT WAYS
Double-line facility at Amarillo, Tex, described is reported to produce welded strings for the entire system, including secondhand rail which is brought to the plant in quarter-mile jointed strings. Operationally, the system for handling secondhand rails is divided into four zones: dismantling, inspection, cropping, and marshalling.

Railway Track and Structures Vol. 70 No. 5, May 1974

ACKNOWLEDGMENT: EI (EI 74 704631)
PURCHASE FROM: ESL Repr PC, Microfilm

01 071962
AN ANALYSIS OF TRACK PARAMETER HETEROGENEITY AS A COMPLEMENT TO GEOMETRICAL METHODS OF TRACK CONDITION RATING
Subject of the paper is methods used for track heterogeneity analysis. They are concerned with selected geometrical and structural parameters as well as with a synthetical track condition rating using track geometry cars. Results of UIC 60 track heterogeneity investigations are quoted.

Baluch, H (Institute of Railway Research, Poland) *Rail International* No. 7-8, July 1974, pp 537-546, 8 Fig., 4 Tab., 6 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

01 071979
MAIN METHODS OF INCREASING EFFICIENCY OF UTILIZATION OF RAILS ON THE SOVIET RAILROADS
Properties of rails and types used in the Soviet Union are presented. While Soviet railroad network represents 10% of the world network, the freight utilization is some 2. 4 times more than in the USA. Heavy axle loads and high speeds characterize Soviet railroads.

Albreht, VG Melentiev, LP *Rail International* No. 5, May 1974

ACKNOWLEDGMENT: EI (EI 74 903047)
PURCHASE FROM: ESL Repr PC, Microfilm

01 071981
C&NW INCREASES ITS RAIL-END WELDING, ADOPTS FOUR-PART MAINTENANCE PLAN
Rail welding and rail maintenance programs and practices at the Chicago & North Western Railroads are discussed. Innovations made in rail welding processes are outlined.

Dove, RE *Railway Age* Vol. 175 No. 13, 07

ACKNOWLEDGMENT: EI (EI 74 902621)
PURCHASE FROM: ESL Repr PC, Microfilm

01 072446
ANALYSIS OF THE RECONSTRUCTION OF RAIL GEOMETRY FROM CURVATURE DATA
The reconstruction of rail geometry from measured curvature data is analyzed. The mathematical concept of curvature is developed and utilized in numerical integration of differential equations describing the rail path. Formulas are derived for various chord-displacement methods of measuring curvature and for their measurement response functions. The reconstruction of rail shapes is demonstrated by means of computer simulation, and the effects of measurement response and measurement error are analyzed. Accuracies are compared with those that might be obtained with accelerometer devices used to measure curvature. The techniques and results can be applied to the design of practical rail measurement systems.

Iverson, WC (Kaman Science Corporation) *IEEE Transactions on Industry Applications* Vol. IA10 No. 3, May 1974, pp 368-379, 10 Fig., 1 Tab., 3 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072450
NUMERICAL PROCESSING OF MEASUREMENT DATA TO MEET FEDERAL TRACK STANDARDS
U.S. railways face a heavy program of track renewal and maintenance following application of government standards to all lines from October 1973. Operators must now insure that Federal requirements for different speed classifications are complied with says M. Robert Rousse, honorary chief engineer of French National Railways, who explains how recording cars equipped for numerical processing of geometric data are being used for programming the work needed to keep permanent way within the new limits.

Rousse, R (French National Railways) *Railway Gazette International* Vol. 130 No. 9, Sept. 1974, pp 345-349, 3 Fig., 1 Phot., 3 Ref.

PURCHASE FROM: XUM Repr. PC

01 072471
TRACK PRACTICES IN THE USSR
A six-man tour sponsored by the Department of Transportation made an 11-day tour of Soviet railroads to give them a look at track problems and practices in the USSR. In this first of two installments, the team of engineers and researchers reports on use of concrete ties and continuous welded rail. Track practices are largely determined by the heavy traffic densities of major routes. The goal is to do as much maintenance work in the shortest possible time, achieved by going to massive, high-production machines wherever possible. Much use is made of prefabricated track panels to speed this process. Various specialized machines are described.
See also RRIS #072568.

Railway Track and Structures Vol. 70 No. 9, Sept. 1974, pp 20-25

PURCHASE FROM: XUM Repr. PC

01 072474
JOINING AND HARDFACING OF RAILS, POINTS AND CROSSINGS USING MANUAL METAL-ARC WELDING ON THE SWEDISH RAILWAYS
Since 1967, the Swedish State Railways track office and the ESAB Central Research Laboratories has been developing a suitable technique and filler materials for rail welding. The first task was to reduce maintenance costs for track material by hard surfacing and joining of rail ends and crossings and later also points. The second phase was to further develop a technique and a backing material for the joining of rails by means of manual mold welding. The aim was to obtain such high quality in welds that the technique would be approved without any limitations.

Ljunggren, J (Swedish State Railways) *Svetsaren-English Edition* No. 2, 1974, 6 pp, 10 Fig.

ACKNOWLEDGMENT: Svetsaren-English Edition
PURCHASE FROM: Elektriska Svetsning Aktiebolaget Box 8850, S-402 71, Goteborg 8, Sweden Repr. PC

01 072475
AUTOMATIC RAILROAD TRACK INSPECTION
A technical survey of the automated stationary and mobile track test train systems to date is presented. The use and availability of sensors is also reviewed. A method of in-situ excitation in conjunction with a radio interrogation coupled to existing railway communication systems is discussed. The automatic inspection system proposed here is limited to the track bed and the rails. The rails are tested for any fissures and flaws and not for the cross-level error and misalignment, although these are invariably also caused by the settling of the track bed. The major feature of this system is the real-time segment interrogations system. Track spacial deployment to cover maximum optimum segment is, however, also discussed. The need for the railroad industry to expand its efforts in the area of the development of automatic track and track bed inspection is shown to be highly desirable as well as economical from an operational standpoint.

Hayre, HS (Houston University) *IEEE Transactions on Industry Applications* Vol. IA10 No. 3, May 1974, pp 280-384, 4 Fig., 19 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072552
PLASTIC MOULDED-SLEEPERS APPLIED TO AN UNDERGROUND RAILWAY TO SURPRESS NOISE.
The Vienna U-bahn system is laid with Voest plastic sleepers embedded in a solid concrete formation incorporating a glass-fibre mat to minimize vibration and noise transmission. Anticombustion and inherent electrical insulation properties are advantageous to Metro lines.

Rail Engineering International Vol. 4 No. 7, Sept. 1974, pp 340-342, 3 Fig., 4 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

01 072553
TRACK FOR TODAY
Improved track formation with deeper ballast of better quality, continuous welded rail, pre-stressed concrete sleepers, simplified track fastenings and highly-developed mechanisation of maintenance was a first overall policy change on BR under the author's leadership. Need of worldwide knowledge is essential in bringing about such improvements.

Butland, AN (British Railways Board) *Rail Engineering International* Vol. 4 No. 7, Sept. 1974, pp 329-331, 5 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

01 072556
ATTAINING THE DURABILITY OF THE TRACK LEVEL
Non-synchronous constant-tamping techniques to attain the required density of compaction now incorporating sleeper-end tamping to obtain 15-cm penetration laterally towards the zone compacted from the sleeper sides combined with automatic adjustment which sees the last 2-mm of lift pressed up and held despite pressure from below by Plasser & Theurer 07-RS system.

Rail Engineering International Vol. 4 No. 7, Sept. 1974, pp 332-333, 2 Fig., 3 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

01 072565
DESIGN, LAYING, MAINTENANCE AND REPAIR OF CONTINUOUS WELDED RAILS ON THE USSR RAILWAYS
Use of continuous welded rails is winning increased acceptance all over the world. This paper sketches the history of the welded rails on USSR Railways and describes the design, laying, maintenance and repair, along with the machines and methods used for laying and welding of continuous strings.

Tzepushelov, AL Toyitzky, LF (Ministry of Railways, USSR) *Rail International* No. 9, Sept. 1974, pp 589-614, 47 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

01 072566
SANTA FE SETS SERIVCE TEST OF RECONSTITUTED TIE
Santa Fe is investigating a process for reconstituting ties, utilizing pieces of and entire ties which have been removed from track and can no longer be burned or left along the right-of-way. Ties are processed through chipping machines in the field and are delivered to the plant for reconstitution. Inorganic materials are removed, the chips are washed and dried if neces-

sary, and the material is reduced to fibers for reconstitution. The fibers are mixed with resins and molded into a conventional ties configuration but supplemented with a steel reinforcement. Santa Fe plans to install the ties in track where traffic amounts of up to 10 million tons annually.

Railway Track and Structures Vol. 70 No. 10, Oct. 1974, pp 18-19, 4 Phot.

PURCHASE FROM: XUM Repr. PC

01 072567
UNIT TRAINS AND THE TRACK; THE PROBLEMS AND THE ANSWERS
This report by the Roadmasters' Association pinpoints the track problems which are produced by unit-train equipment that is characterized by being heavier and having a higher center of gravity. Suggestions are made for assuring suitable life from turnouts and curve rail and the importance of subgrade stability. The problems of rail corrugation are also discussed.

Railway Track and Structures Vol. 70 No. 10, Oct. 1974, 3 pp, 1 Phot.

PURCHASE FROM: XUM Repr. PC

01 072568
TRACK PRACTICES IN THE USSR
This second installment of a report by U.S. engineers and researchers on Soviet railroads was prepared after a trip to Russia. Soviet track maintenance is of four classifications and there is substantial mechanization of these operations, generally with large, expensive machinery. The major effort being devoted to track research in Russia dwarfs similar activity being carried on in the U.S. Details on experimental track-supporting construction are illustrated.

See also RRIS #072471.

Railway Track and Structures Vol. 70 No. 10, Oct. 1974, pp 28-30, 4 Phot.

PURCHASE FROM: XUM Repr. PC

01 072585
TIE RENEWALS AND COSTS
The new tie renewals on U.S. railroads, as compiled by the Economics and Finance Department of the AAR show that new tie renewals dropped from 20.6 million in 1972 to 17.9 million in 1973. While total replacements dropped by 13%, the average cost of ties increased about 10% in 1973. Only in the Eastern District did replacements equal the 1972 figure.

Also available through ESL.

AREA Bulletin Proceeding Vol. 76 Bulletin 649, Sept. 1974, pp 55-63, 2 Tab.

ACKNOWLEDGMENT: AREA Bulletin
PURCHASE FROM: AREA Repr. PC

01 072589
SUMMARY OF PERFORMANCE OF STANDARD-CARBON AND VARIOUS WEAR-RESISTANT RAILS IN TEST CURVES ON THE CHESSIE SYSTEM
This report contains the summary of the first annual inspection of a service test installation of fully heat-treated, induction-head-hardened, intermediate- manganese and standard control-cooled rail on the Chessie System. The field inspection is part of the cooperative effort on rail research of the American Railway Engineering Association, the American Iron and Steel Institute and the Association of American Railroads to observe and analyze those rails in curved track that display some potential for improvement in wear-resistance and retarding the onset of shelling. Measurements were made and recorded of curvature, superelevation and gage, and general track conditons noted of four service test curves located near Oakland, Maryland. Rail head cross-section contours were taken and recorded of 80 test rails contained in these curves.

Schoeneberg, KW *AREA Bulletin* Proceeding Vol. 76 Bulletin 649, Sept. 1974, pp 99-124, 24 Fig.

ACKNOWLEDGMENT: AREA Bulletin
PURCHASE FROM: AREA Repr. PC

01 072655
DIRECTIONS IN TRACK STRUCTURE RESEARCH
This paper presents a survey of contemporary problems in track structure technology and the programs of research and development addressing these problems. It reports current and anticipated investigations into aspects of the service environment of railroad track structures, the mechanics of track structure degradation, the fatigue and fracture of rails, the development of rational design and maintenance techniques, the improvement of track components, and the development of non-conventional, low maintenance track structures for application to high speed high density service. Efforts involved with both the fundamentals of track mechanics, and the design of improved structures for urban rapid transit applications, as well as mainline railroad use are included.

Contributed by the Applied Mechanics Division of the American Society of Mechanical Engineers for presentation at the winter Annual Meeting, 17-22 November 1974, New York, New York.

McConnell, DP (Transportation Systems Center)
American Society of Mechanical Engineers 74-WA/APM-24, July 1974, 9 pp, 1 Tab., 47 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

01 072656
THE STRESS AND STABILITY ANALYSES OF RAILROAD TRACKS
The paper presents a survey of the state of knowledge in the fields of stress and stability determination of a railroad track. At first, the evolution of the railroad track structure is briefly summarized. This is followed by sections which discuss the development of the methods for the determination of stresses in the rails and ties, and the stability of the railroad track due to constrained thermal expansions.

This paper was contributed by the ASME Applied Mechanics Division for presentation at the Winter Annual Meeting, 17-21 November 1974. The research was sponsored by the Department of Transportation, Federal Railroad Administration, Rails Systems Division, Washington, D.C.

Kerr, AD (Princeton University)
American Society of Mechanical Engineers No. 74-WA/APM-23, June 1974, 7 pp, 3 Fig., 41 Ref.

Contract DOT-FR-40017

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

01 072690
ATTEMPT TO DEFINE THE INTERRELATIONSHIP BETWEEN A RAILROAD TRACK AND THE TYPE OF ITS SUBGRADE [Proba okreslenia Zaleznosci nawierzchni kolejowej od rodzaju podtorza]
Experimental section of railroad track that was laid on weak subgrade was used for investigation of the track's behavior during a period of 2 years. Paper attempts to evaluate stress-changes in rails as function of changes in the geomechanical parameters of the subgrade criteria for the serviceability of cohesive subsoils are formulated. [Polish]

Siewczynski, L (Politechnic Poznan, Poland) *Archiwum Inzynierii Ladowej* Vol. 20 No. 1, 1974, pp 193-205, 11 Ref.

ACKNOWLEDGMENT: EI (EI 74 065234)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072706
LATERAL BUCKLING OF TRACK
The stability of this track against lateral buckling is afforded by flexural resistance of the track frame consisting of rails and sleepers and the ballast resistance. An attempt has been made to analyse the resistance offered by sleeper fastenings and represent the same in terms of virtual forces acting on the rails. The energy method has been used for calculating the buckling force, the shape of buckled track has been assumed as a triangle with elastic hinges at the ends. The lateral ballast resistance has been assumed to be constant irrespective of the deflection of buckled track. The present method is simple in calculation and can easily take into account the change in buckling load due to partial or complete loss of lateral ballast resistance of a few sleepers. The effect of various maintenance practices as per Indian Railways Long welded Rails Manual on the safety margin against lateral buckling has also been calculated.

Vaish, VK (Indian Railways) *Rail International* No. N6, June 1974, pp 437-450, 7 Ref.

ACKNOWLEDGMENT: EI (EI 74 065251)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072770
CONTRIBUTION TO THE THEORETICAL EXAMINATION AND EXPERIMENTAL TESTING OF RAILS [Ein Beitrag zur Theoretischen Untersuchung und Experimentallen Pruefung von Eisenbahnschienen]
The forces acting on rails under different conditions of service stress were calculated. Calculations were compared with results of fatigue tests on S49 and UIC60 rails. The variables investigated for their specific effects included locomotives vs freight cars and fast succession of trains. Fracture formation and propagation are discussed. It is concluded that high axle loads require a large rail section, and small wheel diameters also require a high tensile rail steel. The UIC60 rail of steel with 900 N/mm2 minimum tensile strength meets the two requirements and offers ample reserves. [German]

Oberweiler, G *Archiv fuer das Eisenhuettenwesen* Vol. 45 No. 8, Aug. 1974, pp 545-550

ACKNOWLEDGMENT: EI (EI 74 072845)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072771
FAILURES OF RAILS AND TRACK SWITCHES [Schadensfaelle an Eisenbahnschienen und Weichen]
Statistics of failures and investigation of the rail material point out to the specific kind of failure of rails. In particular there occur fractures in the form of the running edge peeling off as well as of cross fractures. Even the rails manufactured of high-strength steels cannot cope with heavy loading, occurring in curves with a narrow radius. This led to the development of rails with a yield point exceeding 600 N/sq mm that are being successfully used. A method for analysis of failures is suggested. [German]

Augustin, H Laizner, H Schossmann, R *Berg und Huettenmaennische Monatshefte* Vol. 119 No. 7, July 1974, pp 268-275, 9 Ref.

ACKNOWLEDGMENT: EI (EI 74 072843)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072773
FOR THE CONCRETE TIE: NEW ROUND OF SERVICE TESTS
More recent developments in concrete ties, especially with reference to new test sections, are dealt with in the article. The four new tests installations described use threadless, elastic-type rail-fastening systems which have been upgraded for North American conditions.

Weber, JW (Portland Cement Association) *Railway Track and Structures* Vol. 70 No. 8, Aug. 1974, pp 17-19

ACKNOWLEDGMENT: EI (EI 74 072832)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072775
DERAILMENTS: THE PROBLEM ONLY DOLLARS CAN SOLVE
The purpose of the study described was to develop the condition of the railroad plant in the United States with respect to tie and rail replacement. The study involved the use of a computer program to determine the long-term maintenance-of-way requirements of railroads and to estimate the amount of deferred maintenance which exists on the railroads. The analysis was made for 25 railroads having a total of 236,000 miles of track.

Dick, MH *Railway Age* Vol. 175 No. 17, Sept. 1974, 3 pp

ACKNOWLEDGMENT: EI (EI 74 072838)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072795
SANTA FE INSTALLS CONCRETE TIE TESTS
Four out-of-face service installations at widely scattered points on system include various types of prestressed mono-block ties as well as different types of fastenings. The fifth installation tests concrete ties on a one-for-one basis. Details of the several test installations, each identified by its location, are described.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Railway Track and Structures Vol. 68 No. 1, Jan. 1972, pp 30-32

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

01 072796
ANALYSIS OF COEFFICIENTS FOR THE CALCULATION OF REINFORCED CONCRETE TIES [Betrachtungen ueber Beiwerte zur Berechnung von Spannbetonschwellen]
From static and dynamic stress measurements on rails and ties, coefficients were derived which are required for calculating the strength properties of concrete ties. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Talposi, A *Glasers Annalen ZEV* Vol. 95 No. 4, Apr. 1971, pp 89-90

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072797
FATIGUE-WEAR TESTING OF RAILS UNDER ROLLING LOAD
The fatigue-wear endurance model tests conducted on surface hardened and untreated low-carbon rails, as well as the test results, are presented. Both the wear and fatigue load resistance of the surface hardened rails surmounted those of the untreated rails.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Toth, L *Acta Technica* Vol. 70 No. 3-4, 1971, pp 445-457

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072798
THERMAL ELONGATION OF RAILS ON ELASTIC MOUNTINGS
Thermal elongation is considered in conjunction with the longitudinal elasticity of rail fastenings. Calculation was made of the behavior of rails on temperature rise in quantitative terms. The sequence of longitudinal loads on elastic rail mountings, thermal elongation involving creep at proportion of rail mountings, and evaluation of continuously distributed rail mounting resistance are discussed.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration. Also available through ESL.

Varga, OH *AREA Bulletin* Vol. 626 Feb. 1970, pp 621-643

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: AREA Repr. PC

01 072799
INCREASING THE STRENGTH OF RAILS AND THEIR RELIABILITY IN SERVICE ON THE RAILWAYS OF THE USSR
The main measures are aimed at increase of the rail strength. Partly the rail strength increase is attained by means of raising the carbon content is steel, improvement of its metallurgical quality and by addition of alloying elements. The drastic improvement of the rail strength is being attained through the heat-treatment. This article comprises also a short review of the investigation of mechanical properties of hardened rails and their performance after 4-year service. The strength is noted to be considerably increased, the contact-fatigue damage reduced greatly and the general durability raised. Authors give also the method of recovering the hardness of the metal in the zone of welded joints in cwr.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Zolotarsky, AF Rauzin, YR *Rail International* Vol. 2 No. 12, Dec. 1971, pp 908-915

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072800
INVESTIGATION OF THE FORMATION OF CORRUGATIONS IN RAILS ON SELECTED TEST TRACKS UNDER CONDITIONS OF ORDINARY TRAFFIC
This is an evaluation of a large amount of data collected on two tracks since 1951 and 1958, respectively. Emphasis was on determining the be-

havior of different steels as a function of composition, melting practice, and treatment after rolling. Examples of findings are that increasing tensile strength and nitrogen content increase corrugations, increasing Mn and Si decrease the defect. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Spieker, W Koehler, H Kuehlmeyer, M *Stahl und Eisen* Vol. 91 No. 26, Dec. 1971, pp 1470-87

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072801
THOUGHTS ON THE SIZE OF BASE COURSES IN RAILWAY CONSTRUCTION

Base courses are the bed of ballast under the sleepers, protective courses or layers laid or made artifically (gravel, cement and lime stabilization, and bituminous courses). The foundation for these courses are the untreated or soil bed. The basic construction of the system; deciding the size of protecting courses; and critical remarks on the process are discussed. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Richter, F *Signal und Schiene* Feb. 1970, pp 57-58

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Transpress VEB Verlag fuer Verkehrswesen Franzoesische Strasse 13-14, 108 Berlin, East Germany Repr. PC

01 072802
VERY HIGH RAILWAY SPEEDS ON THE NEW SUBSTRUCTURES

Spectrum of the geometrical defects in the permanent way are given. Vertical movements and lateral movements are described. The permanent way structure characteristics of the layout of a new line for speeds of 250 to 300 km an hour are discussed. [French]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Prud'Homme, A *Revue Generale des Chemins de Fer* Jan. 1970, pp 56-72

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072803
BETTER RAILS [Amelioration des rails]

By using eutectoid steel with higher carbon and manganese contents than customary, only insignificantly deformed, hard, fatigue resistant rails are obtained when the following patented heat treatment is applied. Start heat treatment immediately after finish rolling. Step-quench in fluidized powder (e.g., of metallic chromium and superheated steam) above Ms, transform isothermally to lower bainite, and temper.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Pomey, J Chavane, R Cornet, R Rozenhole, S Leger, D *Revue de Metallurgie* Vol. 67 No. 1, Jan. 1970, pp 19-22

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072805
MODEL EMSE275 DYNAMIC TRACK ANALYZER

A Gulton Dynamic Track Analyzer is described. The Dynamic Track Analyzer performs three distinct functions. These are measurement of track dimensions, prediction of worst case roll amplitude of a selected type of car, and accumulation of a defect count (figure of merit) for each statute mile of track. All of these functions are performed in real time, giving immediate printed results. Train speed and distance traveled are measured and recorded. By operating the business car equipped with analyzer over a given stretch of track, it is possible to produce a chart showing the car roll for any desired type of car. A chart is attached showing the actual measured roll of a particular car over a section of track compared with the predicted roll determined from operating a business car equipped with the analyzer over the same track.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Gulton Engineered Magnetics Division Instr. Man June 1971

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Gulton Engineered Magnetics Division 212 Durham Avenue, Metuchen, New Jersey, 08840 Repr. PC

01 072808
PROPERTIES OF ISOTHERMALLY QUENCHED AND ALLOY STEEL RAILS

In laboratory and production-scale trials, rails were subjected to austenitizing temperature 850 to 900 C (holding for 1-1/2 hr), cooling for 35 to 40 min in a molten bath of 50% KNO sub 3 and 50% NaNO sub 3 with a water addition of 9.68% to increase cooling efficiency. The temperature of the molten bath varied between 280 and 320 C according to the chemical composition of the steel. The rails are rinsed in hot water (50 C) after quenching. Properties were investigated on sections from carbon, silicon, chromium and Cr-Si-Mn steel rails. The isothermally quenched rails had a high tensile (130 to 160 kg/sq mm) and fatigue strength (53 to 68 kb/sq mm) and, with optimum structure, showed good resistance to brittle failure. Ductile and impact properties were satisfactory and a more favourable pattern of internal residual stresses was obtained.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Kazarnovskii, DS Pridantsev, MV Babich, AP Gurenko, VD Biryukova, VN Aref'ev, BV *Stahl* No. 5, May 1970, pp 465-468

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Metals Society 1 Carlton House Terrace, London SW1 5DB, England Repr. PC

01 072810
UP SOLVES A TEMPERATURE PROBLEM

Equipment for reducing the incidence of pull-aparts in winter and kick-outs in summer in continuous welded rail was developed at Teleweld, Inc., in collaboration with Union Pacific. The equipment is comprised of heating and cooling units mounted on track cars. Welded rail is brought to selected anchoring temperature by heater-cooler.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration. See also Railway Track and Structures, Vol. 66, No. 1, January 1960, p 16.

Railway Age Vol. 168 No. 1, Jan. 1970, pp 26

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

01 072811
FLAME HARDENING OF RAIL HEADS [Flammvergueten von Schienenkoepfen]

A heat treating method, derived from flame hardening, was developed at the West German Federal Railroads to improve the strength properties of rails in order to prevent damages caused by higher loads and increased speeds. This method is described and the results obtained on various standard rail steels. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Geiss, A Rose, A *Werkstatt und Betrieb* Vol. 103 No. 6, June 1970, pp 393-402

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072813
ULTRASONIC 'EYES' ABOARD BRITISH TESTING TRAIN LOCATE RAIL DEFECTS
Ultrasonic "eyes" capable of detecting and recording hidden flaws in railroad tracks have been placed in use in Great Britain aboard a new rail testing train which travels as it works at speeds up to 25 mph. This paper reports the technique.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Materials Evaluation Vol. 39 No. 6, June 1971, pp 16A-18A

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072814
NOW, STEEL-TIE TRACK PANELS, MACHINE PRODUCED
The system is described that uses special wedge-type fastening and mechanized production line for making sections of track.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Railway Track and Structures Vol. 66 No. 5, May 1970, pp 14-17

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

01 072815
TRACKING DOWN JOINT-AREA RAIL DEFECTS
Now by using hand-held testing devices Santa Fe is testing joint-bar areas with ultrasonic devices for detecting bolthole cracks and head-and-web separations. A mirror is used to reflect light into joint gap to reveal presence of defects. Stepped-up method of joint-area inspection has produced big increase in detected defects.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Railway Track and Structures Vol. 66 No. 7, July 1970, pp 21-23

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

01 072816
COMPUTER SPOTS RAIL DEFECTS FAST
Survey of applications of computer complex in the computerizing of rail-defect information developed by a fleet of rail detector cars and a variety of portable ultrasonic testing instruments. A monthly printout from Penn Central computer shows rail defects found by special cars and ultrasonic devices. Computer data is also shown to be useful in programming rail renewals.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Railway Age Vol. 169 No. 1, July 1970, pp 32-33

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

01 072817
SIGNIFICANCE OF A DETECTION OF DEFECTS IN RAILS
The articles describe the principal types of defects which may be found in rails, and indicates those which are inherent in the manufacturing processes and those which arise as a result of service loads. The principles of resonance and pulse-echo ultrasonic flaw detection as applied to rails are given, and the current ultrasonic testing practice at the British Railway is described.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Johnson, PC Wise, S *Non-Destructive Testing* Vol. 3 N Apr. 1970, pp 111-116

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072818
DETECTION OF BASE SEAMS IN INLAID RAILS
A description of a test apparatus that has made possible the detection of rolling mill defects in the seams, located at the base of new rails, installed less than 2 yrs is presented. A semi-automated ultrasonic rail test car, operated at 5 km/hr, is demonstrated.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Veniza, GE *Intl Conf on Nondestructive Testing, 6th Proc* Vol. 3 Session H, Rept. 4, 1970, pp 37-46

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Society for Nondestructive Testing 704 47th Street, Los Alamos, New Mexico, 87544 Repr. PC

01 072822
DESIGN OF CONVENTIONAL RAIL TRACK FOUNDATIONS
Measurements of the distribution of vertical stress in the subgrade for given depths of ballast, track structural configurations and loading conditions are described. The mean maximum vertical stress in the subgrade can be predicted with reasonable accuracy by simple elastic theory. The results of laboratory work in which samples of soil were subjected to repeated triaxial loading are presented. For the cohesive soils tested a level of stress was found above which repeated applications of load caused large permanent deformations and below which permanent deformations were small and terminating. Based on these findings a method of track foundation design is developed in which the depth of ballast required to prevent excessive deformation of the subgrade can be predicted from the results of a simple laboratory repeated load test and a knowledge of the traffic loading to be carried. Small decreases in construction depth from the design depth produce large increases in deformation rate while large increases in construction depth over the design depth produce little return in terms of reduced rates of deformation. The proposed design procedure produces construction depths that are apparently close to the optimum for the fine grained soils so far investigated.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Heath, DL Shenton, MJ Sparrow, RW Waters, JM *Institution of Civil Engineers, Proceedings* 1972, pp 251-267

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072823
M/W EFFICIENCY ON UNION PACIFIC
The best yardstick in measuring the success of a maintenance policy is to compare the quality of the track and roadbed structure, with the maintenance cost, based upon the tonnage of traffic and the speed. Charts are updated each year to compare UP maintenance-of-way operating expenses with those of six other major railroads which have comparable traffic volumes, operating conditions, and so forth. Equipment is updated each year with the latest generation of equipment available; without over-mechanizing. The quality of day-to-day track-maintenance work that is done between the periods of out-of-face heavy program work has more to do to insure the best track conditions at the lowest over-all cost than any other single factor. Section gangs are assigned over the entire railroad to do the day-to-day maintenance work. The section forces mark the bad ties. The number of ties marked in each area is tabulated before the annual tie-gang program is established. UP M/W department is having a problem getting adequate on-track time for its mechanized track gangs engaged in out-of-face work. The only solution to the problem is to maintain close communication with operating department people to get just as much time on the track as possible. UP is a relative newcomer in the use of continuous welded rail. The road has firm rules governing the heating or cooling of the long strings. By vibrating the rail at the same time that it was being heated or cooled, frictional resistance is overcome and the rail is permitted to expand or contract the desired amount at the end of the string. Another area of pioneering for UP is in the use of glued or bonded insulated and closure joints between CWR strings. UP hopes to purchase a self-propelled car capable of testing track at 35 to 45 mph.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Railway Age June 1973, pp 38-41

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

01 072825
DYNAMIC TRACK COMPLIANCE
Analytical expressions for vertical and lateral track compliance are obtained from the solution of a beam on a visco-elastic foundation model. The equivalent foundation parameters were derived from the theory for a mass on a viscoelastic halfspace. The dependence of the overall track stiffness, damping, and natural frequency on the rail, tie, and roadbed parameters are evaluated. Upper and lower bounds for the overall track properties are obtained for existing types of at-grade track structures. A distinct advantage of the approach described is that it results in estimates for the effective damping due to both radiation of energy into the roadbed and energy loss due to internal soil friction. The damping due to internal friction can generally be neglected compared with the radiation damping.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Kurzweil, L
Transportation Systems Center, (TSC-GSP-067) May 1972, pp 13-14

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: TSC Repr. PC

01 072826
PRELIMINARY SPECIFICATION FOR CONCRETE CROSS TIES (AND FASTENINGS)
This specification is intended to provide necessary guidance in the design, manufacture and use of concrete tie railroad track systems and their components. The specification contains minimum performance requirements of components of concrete tie railway track based on a variety of permissible tie spacings and ballast depths. Track constructed of tie and fastener components meeting the specifications applicable to the anticipated usage should be expected to give satisfactory performance under current AAR-approved maximum axle loads. The specification covers materials, physical dimensions, and structural strength of prestressed monoblock and prestressed and conventionally reinforced two-block concrete ties. In addition, longitudinal and lateral load restraint requirements as well as the electrical performance of rail fastener and tie combinations are given. Laboratory tests for the determination of the suitability of new designs are specified, as are necessary quality-control procedures during manufacture. The specification does not cover techniques nor equipment for the manufacture of concrete ties or fastenings. Where current specifications or recommended practices of other technical societies, such as the American Society for Testing and Materials or the American Concrete Institute, are appropriate, they are made part of this specification.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

AREA Bulletin No. 634, Oct. 1971, pp 99-140

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072828
ELECTRICAL HEATING OF RAILWAY POINTS
The heaters are attached by strips held in position by the existing permanent-way coach screws and small bolts through the rails. This form of heating can be readily fixed in position with considerable ease and the only precaution to observe is that the matting surfaces are thoroughly cleaned and the element attached as closely as possible to the rail.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Mawet, MJ *Copper* No. 5, 1971, pp 24-25

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Copper Development Association London 1, England Repr. PC

01 072829
DEVELOPMENT OF A RAILROAD ROUGHNESS INDEXING AND SIMULATION PROCEDURE
To simulate rail vehicle performance on an analog computer to study shock and vibration characteristics of various rail and cargo configurations, input must be provided representing the roughness characteristic of the rail surface. Methods for measuring and simulating rail surface roughness are described which resulted in a recommendation to use a white noise generator to provide the required inputs. Measured accelerations on cargo were found to approximate the characteristics of white noise.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Pursifull, LJ Prothro, BE *Shock and Vibration Bulletin* No. 39, Pt. 6, Mar. 1969, pp 47-55

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Shock and Vibration Information Center Naval Research Laboratory, Washington, D.C., Repr. PC

01 072830
REINFORCED CONCRETE PREFABRICATED PARTS FOR ALL KINDS OF TRACK INSTALLATIONS
Reinforced concrete blocks of various types are made for holding railway tracks. An account is made of the design of these blocks and laying them.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Hagedorn, HP *Eisenbahningenieur* July 1971, pp 171-174

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Dr Arthur Tetzlaff-Verlag Niddastrasse 64, Frankfurt am Main, West Germany Repr. PC

01 072831
SCANNING ELECTRON MICROSCOPY OF EARTHQUAKE—INDUCED RAIL FRACTURES
This investigation has as its purpose a somewhat systematic scanning electron fractography study of railroad-rail fracture resulting from stresses induced by earth movements associated with an earthquake measuring 6.6 on the Richter scale which struck the Los Angeles, California area on February 9, 1971, having a primary shock duration ranging from 1 to 2 min.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Murr, LE Hodgkin, NM Lowe, BV (University of Southern California) *Metallography* Vol. 4 No. 6, Dec. 1971, pp 477-486

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072832
LABORATORY METHODS OF INVESTIGATION OF PRE-STRESSED CONCRETE SLEEPERS
Describes test laboratory measurements to be made of the deformation of sleepers under varying loads and on layers of ballast. Results of these measurements are shown and several conclusions are drawn.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Mazur, S *Deutsche Eisenbahntechnik* No. 12, 1971, p 578

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: VEB Verlag Technik Oranienburgerstrasse 13-14, 102 Berlin, East Germany Repr. PC

01 072834
FRENCH RAILWAYS' TRACK. (VI) LAYING RAILS DIRECTLY ON CONCRETE BLOCKS
Two types of permanent way have been developed: (1) a heavy type for the heaviest traffic stressing when taking curves with small radii has given excellent service, requiring no maintenance whatever, and (2) lighter per-

manent way for straight tracks and curves of large radius. Illustrations show a track laid on concrete blocks, and the rail fastenings in tunnels.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Prud'Homme, A *Eisenbahningenieur* May 1969, pp 144-145

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Dr Arthur Tetzlaff-Verlag Niddastrasse 64, Frankfurt am Main, West Germany Repr. PC

01 072835
DEVELOPMENTS IN TRACKS WITH CONCRETE FOUNDATIONS

Ninety nine percent of the track in the streets of Zurich are laid on concrete slabs. There are 3 rather serious defects in this method, the track is now laid only on an asphalt course. The method using concrete slabs and the asphalt course method are described.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

No. 9 of Wirschaftl. & Techn. Schriftener, pp 47-50, 1969.

Sulger-Buel, A
Battelle Columbus Laboratories

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Battelle Columbus Laboratories 505 King Avenue, Columbus, Ohio, 43201 Repr. PC

01 072836
FRENCH RAILWAYS' TRACK. (V) THE CONCRETE SLEEPER AND ITS RAIL FASTENING

Describes the VW, RS and Vagneux types of track. The VW type is a monobloc stressed concrete sleeper. In the RS and Vagneus types there are two mixed sleepers of concrete and steel with two reinforced concrete blocks joined together by a rail steel stay. The spring fastenings are the same for all three kinds of sleepers. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Prud'Homme, A *Eisenbahningenieur* May 1969, pp 143-144

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Dr Arthur Tetzlaff-Verlag Niddastrasse 64, Frankfurt am Main, West Germany Repr. PC

01 072837
ADJUSTMENTS MADE EASY WITH NEW CONCRETE ROADBED

A major characteristic of the Fist-T system is that each rail is supported on a concrete block using a Fist clip in conjunction with a supporting assembly that has features that are designed to facilitate the making of vertical and lateral adjustments in the rails. This assembly is placed on the block in a recess, located diagonally with the rail.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Railway Track and Structures Mar. 1968, pp 30-31

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

01 072838
STUDY OF NEW TRACK STRUCTURE DESIGNS

The effect of an abrupt change in the elastic foundation properties upon the motion of a high speed vehicle is investigated in detail in this study. Limiting allowable accelerations are chosen as the criteria for riding quality. The study indicates that there is a likelihood of encountering a variety of elastic soil combinations which can seriously deteriorate the riding qualities of a rail vehicle on conventional track. As remedial measures, two alternatives are considered to improve the quality of ride; one by improving the rigidity of the track structure by means of providing a track structure utilizing narrow vertical walls embedded in the subsoil, and the other by carefully compacting the foundation soil to minimize local variations. A study is also made to evaluate the relative economics of the alternatives.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Bhatia, GS Romualdi, JP Thiers, GR
Carnegie-Mellon University Mar. 1968, 103 pp

Contract C-222-66

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-179401, DOTL NTIS

01 072840
FASTENING THE RAILS ON TRACKS FOR VERY HEAVY LOADS [Schienenbefestigung fuer Schwerstbelastete Gleise]

On a special testing machine, which is described and illustrated, rail assemblies were fatigue tested under pulsating loads. The assemblies consisted of the rail, fastened by double shank spring spikes to a steel base plate separated from the tar-oil saturated beechwood tie by a layer of plastic material. The results, which are given in great detail, lead to the conclusion that such an assembly can be expected to have a long service life even in 300 to 500 m long curves, when the mean axle loads are 360 kN and loads occasionally increase to 450 kN. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Eisenmann, J *Stahl und Eisen* Vol. 91 No. 22, Nov. 1971, 3 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072843
CALCULATION OF RAIL BENDING STRESS FOR 125 TON TANK CAR

The calculated bending stresses are shown in the base of rail at speeds up to 75 mph for six rail sections. Stresses for sections of other weights may be approximated by interpolation. The recommended acceptable working stress which should not result in rail bending or breakage is also shown on this chart for (a) light rail in branch lines where speeds will not exceed 35 mph; (b) jointed rail in main line; and (c) continuous welded rail in main line. It will be noted that no difficulty is anticipated with rail bending or breakage on branch lines at speeds up to 35 mph with rail of 80 lb. weight or heavier; or main line jointed rail at speeds up to 60 mph with 100 lb. rail or heavier; and on main line jointed rail at speeds up to 75 mph or continuous welded rail at speeds up to 70 mph with 115 rail or heavier. The above assumes a standard of maintenance of line and surface to accommodate such speeds. Establishment of the acceptable working stress is a matter of judgment and evaluation of the conditions on an individual railway.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Magee, GM
Association of American Railroads Research Center Apr. 1965

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 072844
WELDED RAIL ON BRIDGES

In a quarter-mile length of welded rail movement due to changes in temperature is confined to the 8 rail lengths at each end, with no movement taking place in the 21 rails in the center section. The action of welded rail on bridges is probably not too much different than that of jointed rail because of the resistance to slippage of rail ends in the joint bars. Consequently, the anchorage being used for jointed rail may be useful as a guide. On ballasted deck bridges, welded rail could be used and anchored in the manner used for open track and no consideration need be given to locating the rail joints off the bridge. On open-deck vaiduct spans, anchor every tie for 200 ft each side of any rail joint that falls on the span with two rail spring clips and elsewhere anchor alternate ties with two clips. On open-deck truss spans, box-anchor each tie in the open track for 200 ft at

each end of the span. For spans up to 250 ft it would probably be satisfactory to use no anchors on the bridge except for perhaps two rail lengths at the fixed end and leave the span free to expand and contract at the expansion end. On Open-deck bridges, the welded rail could be used on timber, concrete or steel-beam trestles for any length of bridge with the same anchor pattern as used on open track if the rail joints fall 200 ft off of the bridge.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Magee, GM (Association of American Railroads Research Center) *Railway Track and Structures* Nov. 1965, pp 24-26

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072846
THE EFFECT OF FORCES ON THE RAIL JOINTS, AND THE NOSE-SUSPENDED MOTOR DRIVES OF LOCOMOTIVES
With the help of an analogue computer, the author analyses the reciprocal effects in relation to the speed, the uneveness, and the resilience of the joints. It is concluded that there is close interdependence between the quality of the motor suspension and the reaction on the motor axle. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Handel, H *Deutsche Eisenbahntechnik* Jan. 1972, pp 31

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: VEB Verlag Technik Oranienburgerstrasse 13-14, 102 Berlin, East Germany Repr. PC

01 072847
DEVELOPMENT TRENDS IN TRACK CONSTRUCTION
Conventional to continuous welded track, normal-resistant steel for fishplate jointing to advantageously weldable profiled heaviest rails, wooden and steel sleepers to concrete, resilient fastenings, and concrete deck are discussed.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Munch, W *Eisenbahntechnische Rundschau* No. 12, Dec. 1970, 4 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Hestra[Verlag Holzhofallee 33, 61 Darmstadt, West Germany Repr. PC

01 072848
EFFECTS OF PRODUCTION METHODS ON RESIDUAL STRESSES IN COMPLETELY QUENCHED RAILS
Complete quenching sets up high residual stresses in rails. Tempering lowers them while only slightly reducing rail hardness. Straightening after quenching and tempering again raises the residual stresses, making the rails prone to fracture along the neck. This is due to plastic deformation during straightening in the vertical plane, and to lower the residual stresses the maximum bending deflection should be limited. The increase in the residual stresses is then compensated by the high strength values of steel obtained by quenching.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Konyuhov, AD Rabinovich, DM Vinokurov, IY *Stal* No. 6, June 1969, pp 555-558

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Mezhdunarodynaya Kniga Smolenskaja Ploscad 32/34, Moscow G-200, USSR Repr. PC

01 072850
QUANTIFIED GEOMETRIC STATE OF RAILROAD TRACKS [L'Etat geometrique quantifie]
General principles and methods of statistical analysis of railway track displacements adopted by the Swiss railways are given. The tracks are automatically tested by means of a track inspection car equipped with an analyzer. Statistical properties of discrete data distribution, and the algorithm of the analysis are discussed. Graphs are presented illustrating the analytical results of the track inspection. [French]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Juillerat, T Rivier, R *Bulletin Technique de la Suisse Romande* Vol. 97 No. 5, Mar. 1971, pp 55-63

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

01 072949
COMPUTERIZED PLANNING OF ANNUAL RAIL PROGRAMS
The Chessie System's computer guides the Engineering Department in preparing annual rail replacement programs. The system: (1) Determines the priority of replacement for each unbroken length of track having essentially uniform terrain and operating conditions with age and remaining life calculated; (2) Selects the most economical rail type at a given location applying the discounted cashflow method utilizing a mathematical model which incorporates effects of tax regulations, and interest rates; (3) Provides a long range monitoring of rail condition by computing the annual amount of new rail necessary for a desired level of operating condition.

Reiner, IA (Chessie System) *Railway Management Review* Vol. 74 No. 2, 1974, pp 30-47, 9 Fig., 18 Ref.

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

01 072950
RAILWAYS OF SOUTHERN AFRICA—TRACK PROBLEMS AND SOME SOLUTIONS
In track, South African Railways has followed closely the western European concept—concrete sleepers, good elastic fastenings, with a high ballast standard using continuously welded rail. All aspects of track design, particularly rail and sleeper fastenings, must be designed to reduce maintenance. The author notes that what might appear to be a costly initial design often turns out to be a cost saver in the long run. It is concluded that track design validates the fundamental axiom of engineering: that the closer the design approaches the limit of the strength of the material, the shorter the life of the product.

Pitkin, KJ *Railway Management Review* Vol. 74 No. 2, 1974, pp 9-29, 5 Fig.

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

01 080087
WELDING OF AUSTENITIC MANAGANESE STEEL—SOME EXPERIMENTS INCLUDING A WELDING OF CROSSINGS
This report, a supplement to previous papers, includes three sections on the welding of austenitic manganese steel. First the effects of silicon and phosphorus in the base metal on cracking suceptibility of welds are compared and discussed, based on slit-type and angle-expanding-type (modified Murex-type) cracking tests. Then the manual and automatic gas shielded arc welding of manganese steel to carbon steel is described. Finally the properties of a sort of delayed cracking observed in a 16 Mn, 16 Cr type weld metal and its prevention, which are applicable to the welding of manganese steel crossing frogs to carbon steel rails are investigated. The welds have shown good performance in a field test.

Kimata, N *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 162-167, 6 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

01 080105
MANY NEW APPLICATIONS FOR 'NON-CLOGGING' SNOW SWITCH
A special switch based on the stub principle, which was originally developed for use as a snow-free switch in yards, is now being offered for use wherever conditions are such as to cause split switches to become clogged and rendered inoperable unless cleaned out. An application on the Lake

Terminal Railway on a track at the coke-oven quench track has proved to be resistant to clogging by materials other than snow and ice, and has eliminated a problem with derailed cars at that point.

Railway Track and Structures Vol. 70 No. 12, Dec. 1974, pp 22-23, 1 Fig., 2 Phot.

PURCHASE FROM: XUM Repr. PC

01 080114
INVESTIGATION OF 132 LB/YD RAIL MADE FROM VACUUM DEGASSED STEEL

Presently rails are manufactured in 39 ft. lengths. The desire to obtain longer lengths of rail has been expressed by many railroads because of savings anticipated from a reduction in the number of welded joints required in continuous welded rail strings. One factor inhibiting the production of rails longer than 39 ft. is the practice of control cooling in covered containers. Control cooling is employed to prevent the development of internal flakes or shatter cracks that have been causally related to the level of hydrogen absorbed in the steel. With the use of vacuum degassing hydrogen content is controlled by a different technique; therefore, it is believed that rails made of vacuum degassed steel can be air cooled without shatter cracks developing. The purpose of this investigation is to determine whether rails made from vacuum degassed steel and air cooled are comparable in properties with rail steel produced by currently common practices. This laboratory evaluation of 132 lb. RE rail made from vacuum degassed steel was made for the Norfolk and Western Railway. As measured in the laboratory, the properties of these vacuum degassed heats, without controlled cooling, were comparable to those measured previously for steels made by more conventional techniques and subjected to controlled cooling.

Research sponsored by the Norfolk and Western Railway Company.

Association of American Railroads Research Center, (70-R-42) Res. Rpt. R-110, Oct. 1971, 57 pp, 42 Fig., 10 Tab., 31 Phot.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080120
SIXTH PROGRESS REPORT OF COOPERATIVE RESEARCH ON WOOD TIES BY THE RAILWAY TIE ASSOCIATION AND THE ASSOCIATION OF AMERICAN RAILROADS RESEARCH AND TEST DEPARTMENT

The Railway Tie Association and the Association of American Railroads entered into a cooperative agreement on March 18, 1965 for the AAR Research Center to "conduct an investigation, both analytical and in the laboratory, for the purpose of ascertaining criteria for the most effective system for supporting rail of various sections on wood railway ties, taking into acount tie spacing, length, and size of cross section." This report presents the progress in the study of the effects of tie size and spacing on the development of an effective supporting rail system.

Association of American Railroads Research Center R-111, Dec. 1971, 6 pp, 6 Fig., 2 Tab., 1 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080124
INVESTIGATION OF RAILS MADE FROM CONTINUOUSLY CAST BLOOMS BY ALGOMA STEEL CORPORATION

This evaluation of rails made from continuously cast blooms by the Algoma Steel Corporation and submitted to the AAR Research Department by the Algoma Central Railway, resulted in the conclusion that physical properties of rail rolled from continuously cast blooms compared with rail rolled from ingots shows that the rails rolled from continuously cast blooms have a slightly higher ultimate tensile strength, yield strength, reduction of area and elongation.

Sponsored by Algoma Central Railway.

Association of American Railroads Research Center, (69-T-26) R-104, Oct. 1970, 51 pp, 35 Fig., 8 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080126
INVESTIGATION OF 140 LB/YD RAIL MADE FROM VACUUM DEGASSED STEEL

Presently rails are manufactured in 39 ft. lengths. The desire to obtain longer lengths of rail has been expressed by many railroads because of savings anticipated from a reduction in the number of welded joints required in continuous welded rail strings. One factor inhibiting the production of rails longer than 39 ft. is the practice of control cooling in covered containers. Control cooling is employed to prevent the development of internal flakes or shatter cracks that have been causally related to the level of hydrogen absorbed in the steel. With the use of vacuum degassing, hydrogen content is controlled by a different technique; therefore, it is believed that rails made of vacuum degassed steel can be air cooled without shatter cracks developing. The purpose of this investigation is to determine whether rails made from vacuum degassed steel and air cooled are comparable in properties with rail steel produced by currently common practices. As measured in the laboratory, the properties of this vacuum degassed heat, without controlled cooling were comparable to those measured previously for steels made by more conventional techniques and subjected to controlled cooling.

Sponsored by the Pennsylvania Railroad.

Association of American Railroads Research Center, (70-R-58) R-101, June 1970, 43 pp, 29 Fig., 8 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080284
SUMMARY OF HEAT-TREATED AND ALLOY RAIL SERVICE TEST INSTALLATIONS ON CURVES WITH SHELLY HISTORIES—1972

The AAR, in its program of Rail Research, has a project of field inspection and analysis of those rails that continue in service which show some potential for improvement in performance. The field inspections are carried out as a cooperative effort of the American Railway Engineering Association (AREA) Rail Committee, the American Iron and Steel Institute (AISI), and the AAR Research and Test Department. This report is a summary of results of the August and September 1972 inspections of seven field test installations of High-Silicon, Curvemaster, Fully Heat-Treated and Columbium Treated Rails.

An RPI-AAR Cooperative Project.

Schoeneberg, KW
Association of American Railroads Research Center, (R009) Res. Rpt. R-121, Apr. 1973, 59 pp, 28 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080285
RAIL RESEARCH-PROBLEM DEFINITION

A program was initiated to determine and define the problems associated with rail. The purpose was to collect and analyze facts regarding national and international experience on rail behavior, in order to focus attention on the major unresolved problems in rail. These are (1) Joint area problems, both bolted and welded, (2) Plastic deformation of rail head causing shelling, (3) Rail defects and premature removal of rail from track, and (4) Appropriate selection of rail based upon service requirements-use criterion. This report presents a background study of rail design, chemical composition and heat treatment of rail, manufacturing and rolling of rail-reviewing problem areas of each. A discussion of rail defects and the background and techniques of rail defect (flaw) detection is also presented. Recommendations are made for further research and study on bolt hole drilling, rail straightness, new rail steel process and manufacturing techniques, wheel/rail interaction, fracture properties and defect propagation of present and proposed rail steels, rail flaw detection technology, and economic use criterion of rail.

Schoeneberg, KW
Association of American Railroads Research Center, (70-R-66) Res. Rpt. R-120, Mar. 1973, 81 pp, 45 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080348
CTA REBUILDS TRACK UNDER TRAFFIC
The author reports how short sections on track of the Chicago Transit Authority are removed and a front-end loader is used to push the roadbed material toward a locomotive crane. Track is rebuilt with new material, including continuous welded rail. While the area is still excavated, the top bridge surfaces over streets and business establishments are waterproofed.

Dove, RE *Railway Age* Vol. 175 No. 19, Oct. 1974, 2 pp

ACKNOWLEDGMENT: EI (EI 74 080395)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 080357
INVESTIGATION FOR INCREASING THE STABILITY OF RAILROAD TRACK [Forschungen zur Erhoehung der Lagebestaendigkeit des Eisenbahngleises ein Wichtiger Beitrag fuer Fahrweg und Fahrzeug]
The article reports on possible improvements of the track for increasing its life in respect of the track position to meet the present and future requirements at higher speeds. Track and switch construction including the associated changerover methods are optimized to obtain the best possible track for the vehicle, under due consideration of the cost of furnishing machinery and equipment and the cost of vehicle and track maintenance. [German]

Birmann, F *Glasers Annalen ZEV* Vol. 98 No. 7-8, July 1974, pp 266-276, 18 Ref.

ACKNOWLEDGMENT: EI (EI 74 080394)
PURCHASE FROM: ESL Repr. PC, Microfilm

01 080366
SUMMARY OF PERFORMANCE OF STANDARD-CARBON AND VARIOUS WEAR-RESISTANT RAILS IN TEST CURVES ON THE CHESSIE SYSTEM
This report contains the summary of the first annual inspection of a service test installation of fully heat-treated, induction-head-hardened, intermediate-manganese and standard control-cooled rail on the Chessie System. The field inspection is part of the cooperative effort on rail research of the American Railway Engineering Association, the American Iron and Steel Institute and the Association of American Railroads to observe and analyze those rails in curved track that display some potential for improvement in wear-resistance and retarding the onset of shelling. Measurements were made and recorded of curvature, superelevation and gage and general track conditions noted of four service test curves located near Oakland, Maryland. Rail head cross-section contours were taken and recorded of 80 test rails contained in these curves.

Direct requests to the Director's Office, AAR Technical Center, Chicago, Illinois.

Schoeneberg, KW
Association of American Railroads Research Center, (R009) R-156, Mar. 1974, 34 pp

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080368
METALLURGICAL EXAMINATION AND PHYSICAL TEST RESULTS OF CHROMIUM AND MANGANESE-VANADIUM ALLOY RAIL STEEL INVESTIGATION
This report contains the results from metallurgical examinations and laboratory accelerated testing of samples of chromium and manganese-vanadium rail to determine the quality and strength of these types of rail steel. The rail samples, for purposes of this investigation, of both types of rail were furnished to the AAR Technical Center by Canadian Pacific Limited. The investigation consisted of rolling load tests, drop tests, slow bend tests, physical property determinations, charpy impact tests, chemical analysis, hardness surveys and macroscopic and microscopic examinations conducted at the AAR Technical Center in Chicago, Illinois.

Direct requests to the Director's Office, AAR Technical Center, Chicago, Illinois.

Schoeneberg, KW
Association of American Railroads Research Center, (R-048) R0160, June 1974, 46 pp

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

01 080413
ANALYSIS OF NAD CRANE MAINTENANCE OF WAY
The report represents an in-depth comprehensive analysis of NAD Crane's railroad maintenance of way (M/W) program. Quantitative tools have been developed to provide a rational framework for decision making for M/W. This analysis was prompted by the occurrence of numerous derailments attributed to poor track conditions. The safety aspects of derailments of hazardous material including high explosives required a thorough analysis of causes related to operations of the Ordnance Department and the Public Works Transportation, Maintenance, and Maintenance Control Division. The report presents several recommendations for the establishment of annual levels of maintenance, recommendations on the equipment required, and recommendations on the priority use of maintenance resources. (Author)

Lueking, JR Hinkle, GJJ
Naval Ammunition Depot NAD-CR-RDTR-285, Sept. 1974, 133p

ACKNOWLEDGMENT: NTIS (AD/A-000066/1SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-000066/1SL, DOTL NTIS

01 080462
COPING WITH SNOW [Teknisk-Ekonomisk Jaemfoerelse Mellan Betongbroar Utfoerda I Laettballastbetong och Konventionell Betong]
This review of recent developments in snow fighting shows a rather restricted range of available equipment. A few manufacturers worldwide have specialized in the design of heavy-duty snow plows and other clearing equipment. While lighter equipment and preventive measures are concerns of other manufacturers, most have narrowly specialized ranges of equipment. Such units include snow blowers, sweepers and brushes, along with melting equipment. [Swedish]

Alkbrant, F *Nordisk Betong* Vol. 130 No. 11, Nov. 1974, pp 23-26 4, Fig.

ACKNOWLEDGMENT: Transport and Road Research Laboratory (IRRD 207246)
PURCHASE FROM: National Swedish Road & Traffic Research Institute Drottning Kristinas Vag 41, S-11428 Stockholm, Sweden Repr. PC

01 080463
MECHANISED SNOW CLEARANCE KEEPS NORWAY'S TRAINS ON THE MOVE
Few lines in the world suffer from winter conditions as severe as those on the Bergen line, but the whole Norwegian State Railways network requires specialised equipment to clear snow and ice at an annual cost of 14 million kroner. Careful selection and positioning of mechanised snowplows and static devices such as fences and snowsheds keep the line clear of bulk snow, while points, rodding and flangeways have to be heated or protected by techniques still evolving.

Evenmo, O (Norwegian State Railways) *Railway Gazette International* Vol. 130 No. 11, Nov. 1974, pp 423-426, 1 Fig., 5 Phot.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

01 080773
NEW RAILROAD HAS STEEL TIES
A seven mile railway using preassembled steel-tie track panels is almost completed in northern Michigan. The railway connects the Tilden Mine and Pelletizing Plant near Ishpeming, Michigan with the Lake Superior and Ishpeming Railroad. The construction crew, though inexperienced in track laying, was able to lay about 800 feet per day. The panelized track comes in 39 foot sections and was manufactured by the L.B. Foster Company of Pittsburg.

Progressive Railroading Vol. 17 No. 8, Aug. 1974, pp 27-28

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

01 080789
NW EMPHASIZES STRONG TRACK, WELL MAINTAINED
Norfolk & Western is committed to a policy of having strong track handled by a well-equipped maintenance organization which is adequately supplied with replacement materials. This article discusses various facets

of the road's track programs and the maintenance groups which do the work. There has been great emphasis on mechanization. One result is a maintenance expense per thousand gross ton miles which is among the lowest in the U.S.

Dick, MH *Railway Age* Vol. 175 No. 21, Nov. 1974, pp 24-26, 3 Phot.

PURCHASE FROM: XUM Repr. PC

01 080790
WINTER ON THE ALASKA—HEAVY SNOW, SUB-ZERO COLD, HIGH WINDS AND RAIN
Meeting the problems of heavy snow, sub-zero cold, high winds and rain are regular assignments of the snowfighting forces on the northernmost railroad in the U.S. Maintenance- of-way officers on this federally owned line are organized and prepared to confront extremes of weather, assuring the operation of the railroad. The steps taken on the Alaska are described.

Railway Track and Structures Vol. 70 No. 8, Aug. 1974, pp 28-30, 2 Phot.

PURCHASE FROM: XUM Repr. PC

01 080973
MEANS AND METHODS TO INCREASE TRACK STABILITY
The stability of track is a serious problem for every railroad, especially since the introduction of welded rail. The primary concern of this paper is the behavior of track after trackwork has been carried out with particular regard to its geometry. Such work affects the resistance of track to all types of movement, both under traffic and induced by climatic conditions. The attention is directed at conventional track structures because too little is so far known about other types. It is concluded that a high standard of track geometry can only be maintained by lining machines; modern equipment can efficiently increase the lateral resistance of the ballast bed; and track stiffness can be increased with appropriate fasteners and new types of ties.

Riessberger, KH *AREA Bulletin* Vol. 75 Bulletin No. 648, June 1974, pp 797-811, 15 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

01 081260
METHOD OF ASSESSING THE ENDURANCE OF SLEEPERS ON A TRACK USED FOR FREIGHT TRAFFIC [Metodika ocenki vynoslivosti zelezobetonnyk spal e ucetom gruzonaprjazennosti linu]
The article describes a method and results of comparative assessment of the endurance of reinforced concrete sleepers under various operating conditions. The main parameter defining the work capacity of reinforced concrete sleepers in various operating conditions is the endurance threshold of the sleeper in certain transversal cross-sections. The "typical load", a value which determines the endurance of the sleepers for a specific type of freight traffic, is essentially a function of the type of rail and number of fully-loaded heavy wagons; it is calculated on the basis of: (1) the number of loading cycles borne by the sleeper; (2) the maximum load applied during these cycles; and (3) the frequency of the repetition of these cycles, according to the traffic. This method may be applied, for instance, when assessing the endurance of reinforced concrete sleepers in the case of an increase in the axle load. [Russian]

Malysev, VG *Vestnik Vniizt* No. 3, 1974, pp 38-43, 4 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1136)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

01 081267
PARTICULAR CHARACTERISTICS OF TRACK MAINTENANCE ON HIGH SPEED LINES [Osobennosti soderzanija puti na ucastkah vysokoskorostnogo dvizenija poezdov]
Based on experience from the introduction of high-speed traffic on the "October" network (Moscow-Leningrad), the article considers the particular characteristics of routine track maintenance on high-speed lines, and gives recommendations for this maintenance for speeds of up to 200 km/h. According to the article, the specific requirements of routine track maintenance, when traffic speeds rise to 200 km/h confirm that man-power demands do not increase beyond 12-15%. This increase is determined in advance by the higher standard of inspection and protection of the track. The increase in speeds up to 200 km/h in passenger transport will not therefore lead to any appreciable increase in expenditure for routine track maintenance, but will require a reduction in the intervals between the periodical engineering work on the line. [Russian]

Andreev, GE *Zeleznodoroznyj Transport* No. 1, 1974, pp 63-67, 3 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 866)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

01 081268
TESTING LATERAL SLIPPING OF THE TRACK WITH A NEW DESIGN OF SLEEPER IN THE AUSTRIAN FEDERAL RAILWAYS [Gleisverwerfungsversuche der Oesterreichischen Bundesbahnen mit neuen Schwellenformen]
Tests on the lateral slipping of the track on a curve with a radius of 189 m have shown that the track's resistance to lateral displacement was considerably improved by modifying the shape of the sleepers, and that the welding of the rails was also possible with smaller radii. The resistance to lateral displacement of the Be 14 d sleeper with lugs is twice that of the B 14 sleeper without lugs, and 50% higher than the resistance of the Be 17 sleeper, which has about the same basic surface as the Be 14 d sleeper. [German]

Klugar, K *Eisenbahningenieur* Vol. 25 No. 3, Mar. 1974, pp 70-75, 12 Fig., 3 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 876)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

01 081269
MANUFACTURE OF MONOBLOC CONCRETE SLEEPERS IN INDIA
A short but full article on the problem of concrete sleepers as dealt with by the Indian Railways. The author gives details of: (1) the production technique adopted: site and production capacity of manufacturing factories; (2) the basic specifications finally chosen for the sleepers; (3) the manufacturing technology and its development; and (4) future projects.

Parthasarathy, R *Indian Railway Technical Bulletin* Vol. 30 No. 189, May 1973, pp 47-57, 4 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 880)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

01 081382
COMPUTERIZED SUPERVISION OF TRACK MAINTENANCE
Japanese National Railways has computerized the planning of the maintenance of its 26,000 km of main lines, 13,000 km of sidings, and 70,000 switches. JNR has programmed the replacement of 2,000 km of rail yearly. For each individual turnout, data is stored on the parts involved, on the results of annual inspections, and on the speed and volume of movements. Initially tie condition has involved the almost 38 million wood ties on JNR but the growing number of prestressed concrete ties are to be included in the future. Seven high-speed track inspection cars are being fitted to provide input for a maintenance planning system. While problems remain, computerization of maintenance equipment control, track improvement planning and track work estimates are being made.

Inoue, T (Japanese National Railways) *Japanese Railway Engineering* Vol. 15 No. 1, 1974, pp 9-13, 5 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

01 081388
CHOOSING THE RIGHT TRACK FOR URBAN CONDITIONS
Several conurbations in South America, India and the Far East are building or planning metros to cope with a huge rise in population. The author draws on five year's experience as Deconsult's chief consulting engineer to the Sao Paulo metro—which opened last September—to present and discuss technical and economic criteria for the choice of track design and

components, and for the design and installation of concrete slab track with vibration suppression.

Hehenberger, W *Developing Railways* 1975, 7 pp, 6 Ref.

ACKNOWLEDGMENT: Developing Railways
PURCHASE FROM: XUM Repr. PC

01 081637
COMPOSITE MATERIALS FOR RAILROAD APPLICATIONS
A six month feasibility study was conducted to evaluate the possibility of renovating deteriorated wooden railroad ties to extend their useful life. Monomer impregnation of ties, with subsequent polymerization, was tried using methyl methacrylate. Improvement in strength was noted but problems were foreseen in the relatively large amount of monomer loading required and in tie removal and reinsertion for this process, with consequent unfavorable economics. Techniques were evaluated for in-place spraying and/or coating of ties. Very favorable improvements in strength were obtained with epoxy resins. These techniques appear to offer significantly improved strength and durability, since the intention is to fill cracks and checks in the deteriorated tie. This should enhance weathering and freeze-thaw resistance and extend the life of the tie in place. The economic outlook for this technique may prove favorable compared to new tie replacement. It is recommended that the research continue to develop suitable resin formulations, test methods and equipment for field application of upgrading the condition of a deteriorated tie by the in-place technique. Resin systems to be evaluated include filled or extended epoxies and hot-melt, coal tar derivatives.

Beller, M Steinberg, M
Brookhaven National Laboratory BNL 50371, Feb. 1973, 29 pp, 4 Fig., 5 Tab., 9 Ref.

ACKNOWLEDGMENT: NTIS
PURCHASE FROM: NTIS Repr. PC

01 083026
TRACK GEOMETRY MEASUREMENTS AND DATA PROCESSING DEVELOPMENTS IN THE RAIL RESEARCH PROGRAM
This report summarizes the FRA-sponsored Rail Research Program, and outlines many of the problems presently encountered by the railroad industry in providing safe, high-speed transportation; and illustrates the vital role of cost-effective maintenance planning. This report was originally presented at the IEEE/ASME Joint Railroad Conference in St. Louis, Missouri, in April 1973. The FRA Test Cars are described, with emphasis placed on the ability of the cars to measure all parameters of track geometry at high speed. Examples are included of the various types of computer-generated reports which are designed specifically for personnel who are responsible for maintenance planning and operations. The information in this report is intended for use by a general audience who desires a comprehensive nontechnical summary of the operation and application of the FRA Test Cars, related instrumentation and data processing operations.

This project is sponsored by the Federal Railroad Administration, Department of Transportation.

From, L
ENSCO, Incorporated, (DOT-FR-74-2Z) Tech. Sum. FRA-ORD&D-75-14, Oct. 1974, 29 pp, 20 Fig.

Contract DOT-FR-20032

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-239463/AS, DOTL NTIS

01 083027
DEVELOPMENT OF AN INERTIAL PROFILOMETER
The information in this report covers the design, fabrication and testing of an inertial profilometer system, developed for use on the FRA Test Cars. The profilometer is used to measure rail profile at high speeds, relative to an inertial reference. Design details and analysis of the profilometer are covered, and comparisons are made between profilometer measurements, mid-chord measurements, and manual measurements made with stringline and roll-ordinator devices, to show the relative accuracy of the profilometer measurements. The inertial profilometer offers several advantages over the currently-used mid-chord syystem. Accuracy of the profilometer has proven to be quite good. Operation of the profilometer is not degraded by inclement weather, and system components are not subject to damage by protruding objects in close proximity to the rail being measured.

Brandenburg, EL Rudd, TJ
ENSCO, Incorporated, (DOT-FR-74-06) FRA-ORD&D-75-15, Nov. 1974, 45 pp, 23 Fig.

Contract DOT-FR-20032

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-239464/AS, DOTL NTIS

02 052526
ELASTIC SYSTEMS FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTRE BUFFERS). THEORETICAL STUDIES OF THE DEVELOPMENT OF LONGITUDINAL FORCES IN GOODS TRAINS EQUIPPED WITH CONVENTIONAL ELASTIC ELEMENTS (FORCE A FUNCTION OF STROKE ONLY)
The influence of the characteristics of the elastic elements on the occurrence, on the development (in time and space) and on the value of the longitudinal forces in trains has been examined for several variants of spring-mass systems. Examination of the braking process has shown that the longitudinal force can be considered as being composed of a "rigid" component, an "elastic" component and a "coefficent of friction" component. With a suitable spring stiffness, combined with a brake-cylinder filling time adjusted accordingly, a "sub-critical development of the longitudinal forces"-and thus a substantial reduction in the values of the maximum longitudinal forces-can be achieved. The development of the longitudinal forces during gradual braking and during starting is also dealt with. The validity of the mathematical model has been confirmed on the basis of the results obtained during tests with actual trains. Future running trials can thus be restricted to an absolute minimum. Finally, the report indicates the optimum spring characteristics for permitting a "sub-critical development of the longitudinal forces" to be obtained during braking.

International Union of Railways B36/RP 9/E, Apr. 1972, 124 pp, 47 Fig., Tabs., 7 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

02 052546
ADHESION OF LOCOMOTIVES FROM THE POINT OF VIEW OF THEIR CONSTRUCTION AND OPERATION, ADHESION TESTS IN 1971
In Report No. 9 the results of the first series of tests carried out between Wadgassen (DB) and Hargarten (SNCF) with Test Machine 18000 were described. The present report contains details of further tests made during 1971 on the Gresy-sur-Aix—Annecy—La Roche-sur-Foron line, in France, and on the Wadgassen—Hargarten line. The relationships investigated were: (1) the effect on adhesion of axle-load, running speed, pinion stiffness, track curvature, sanding, as well as the method of control; (2) the effect on slip of sanding and method of control; and (3) the effect of transmission elasticity on the appearance of stick-slip oscillations. Theoretical analyses of the stick-slip oscillation phenomenon, and adhesion in curves are appended.

International Union of Railways B44/RP 10/E, Oct. 1973, 40 pp, Figs., Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

02 052547
INTERACTION BETWEEN VEHICLES AND TRACK. GEOMETRY OF THE CONTACT BETWEEN WHEELSET AND TRACK. PART I: METHODS OF MEASUREMENT AND ANALYSIS
The geometry of the contact between wheelset and track introduces the equivalent conicity concept, which is one of the important parameters intervening in the study of the riding stability of railway vehicles. After having outlined a concise theory and after having described some devices permitting the recording of wheel and rail profiles, the calculation methods and the results obtained are described.

International Union of Railways C116/RP 3/E, Oct. 1973, Figs., 4 Ref., 14 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

02 052563
CONSTRUCTIONAL ARRANGEMENTS FOR IMPROVING THE RIDING STABILITY AND THE GUIDING QUALITY OF ELECTRIC AND DIESEL LOCOMOTIVES AND VEHICLES. MEASUREMENT OF THE FORCES ACTING BETWEEN WHEEL AND RAIL
The knowledge of the forces acting between wheel and rail is important when studying the riding stability of a vehicle. Several procedures are available to measure these forces using measuring wheelsets. Several Administrations have developed, for this purpose, wheelset calibration rigs, whose design is described in a special chapter. Another chapter concerns the costs of these measurements. Some application examples should give an idea of the possibilities offered by the methods described.

International Union of Railways B10/RP 14/E, Oct. 1973, 46 pp, Figs., 9 Ref., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

02 052590
ELASTIC SYSTEMS FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTER BUFFERS). SPECIFICATION LEAFLET FOR ELASTIC SYSTEMS. PART 1: ELASTIC SYSTEMS WHOSE SPRING FORCE IS DEPENDENT CHIEFLY ON COMPRESSION (LINEAR CHARACTERISTICS)
The first main part of the report comprises the general specification containing the technical conditions for the elastic systems for goods wagons equipped with automatic couplers and belonging to the UIC and OSJD member administrations. The second part covers the special specification applicable to the UIC member administrations (with the exception of member administrations who are also members of the OSJD) as well as comments on the factors on which these specification conditions were based.

International Union of Railways B36/RP 12/E, Apr. 1974, 51 pp, Figs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

02 052591
ELASTIC SYSTEMS FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTER BUFFERS). SPECIFICATION LEAFLET FOR ELASTIC SYSTEMS. PART 2: COMBINED HYDRAULIC SYSTEMS: GAS AND MECHANICAL ELASTIC ELEMENTS. PART 3: ELASTOMER ELASTIC SYSTEMS WITH HYDROSTATIC COMPRESSION
The first main part of the report comprises the general specification containing the technical conditions for the elastic systems for goods wagons equipped with automatic couplers and belonging to the UIC and OSJD member administrations. The second part covers the special specifications applicable to the UIC member administrations (except those who are also members of OSJD), as well as comments on the factors on which the special specification conditions were based.

International Union of Railways B36/RP 13/E, Oct. 1974, 85 pp, Figs., Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

02 057340
WHEELSLIP
Wheels slip because the tractive effort or force they are being asked to transmit is more than the prevailing adhesion conditions will permit. Conversely, wheelslide occurs when the braking or retarding force is too great for the adhesion conditions. While those statements might appear simple, the conditions they describe present very real problems. Attempting to solve the problems has taxed the ingenuity of engineers for decades. Many of the details discussed in this article are equally applicable to other forms of transportation, in fact adhesion problems apply to all forms of transport involving the transmission of force via surfaces in contact whether they be rail, road, air (wheel-brake only)—or even pedestrian. A fundamental point which must be borne in mind throughout is that the maximum tractive effort which can be transmitted is the product of the prevailing adhesion factor and the actual adhesive weight.

Scott, M (GEC Traction Limited) *Modern Railways* Vol. 31 No. 309, June 1974, pp 222-226, 6 Fig., 5 Phot.

ACKNOWLEDGMENT: Modern Railways
PURCHASE FROM: XUM Repr. PC

02 057415
MATHEMATICAL MODELS AND CALCULATION METHODS IN THE STUDY OF LATERAL DYNAMICS OF RAILROAD CARS [Modelli matematici e metodi di calcolo nello studio della dinamica laterale dei veicoli ferroviari]
The conditions affecting lateral dynamics of railroad cars, such as axle-box guides and forces of pseudosliding, rail profiles and tires, are considered. Mathematical models of railroad cars are derived for an analysis of lateral dynamics. Both linearized and nonlinear systems are analyzed and results are optimized. Experimental results are compared as well. It is concluded that the theory of pseudosliding permits an improvement of the study of the lateral dynamics of railroad cars, both of the normal type with 2 or 3 axles, as well as of unconventional vehicles such as those with independent wheels or with active guide elements. [Italian]

Bonadero, A (Fiat Company, Italy) *Ingegneria Ferroviaria* Vol. 28 No. 10, Oct. 1973, pp 836-843, 10 Ref.

ACKNOWLEDGMENT: EI (EI 74 604262)
PURCHASE FROM: ESL Repr PC, Microfilm

02 057427
VIBRATION DYNAMICS OF RAIL AXLES [Dinamica vibrazionale delle sale ferroviarie]
First, the dynamic configuration of an axle, generated by forced vertical excitation of the two wheels, is considered. A mathematical model of the vehicle and the axle vibrations is derived and analyzed. The frequencies of the axle are determined with the variation of the characteristic parameters of the vehicles and of the axles themselves. In the second part of the article, the dynamic stresses are sought, generated by typical excitation of the line and acting on the axle with the variation of the speed of the vehicle, in order to achieve optimum design. [Italian]

Panagin, R *Ingegneria Ferroviaria* Vol. 28 No. 9, Sept. 1973

ACKNOWLEDGMENT: EI (EI 74 602766)
PURCHASE FROM: ESL Repr PC, Microfilm

02 057438
ULTRASONIC CONTROL OF THE LOOSENING OF RAILWAY WHEEL RIMS [Verifica dello stato di allentamento de cerchioni ferroviari mediante l'impiego degli ultrasuoni]
A brief outline is given of the mechanical characteristics of forced keying of the rims; as well as the operating conditions which encourage their loosening and the present empirical methods of control. The principle of the propagation of ultra-sounds in forced contacts is then theoretically introduced, and on this principle is based the study which concludes with the presentation of a new method of control of the state of keying of wheel rims by means of ultra-sound. [Italian]

Costanzo, B *Ingegneria Ferroviaria* Vol. 28 No. 12, Dec. 1973

ACKNOWLEDGMENT: EI (EI 74 605341)
PURCHASE FROM: ESL Repr PC, Microfilm

02 057460
THE GEOMETRY OF THE CONTACT BETWEEN WHEELSET AND TRACK [Geometrie der Beruhrung Zwischen Radsatz und Gleis]
The geometric relationships governing contact between wheelset and track are of fundamental importance for the running behavior of rails vehicles. This article describes the present stage of wheel profile development. [German]

Nefzger, A *Eisenbahntechnische Rundschau* Vol. 23 No. 3, Mar. 1974, pp 113-122, Figs.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

02 057461
RAIL STRESS DUE TO LOADING AND ROUTE PROPERTIES [Beanspruchung der Schiene durch die Belastung und die Gegebenheiten des Fahrweges]
The authors report on extensive measurements of transverse forces with test wheelsets against the background of steadily higher loading as a result of heavier and faster trains. These results are placed in relation to stationary measurements of transverse forces, stresses and track subsidence, and from this deductions are made with respect to the design of permanent way and vehicles. [German]

Birmann, F Herbst, W (Berlin Technische Universitaet) *Eisenbahntechnische Rundschau* Vol. 23 No. 3, Mar. 1974, pp 104-112, Figs., 18 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

02 057463
SKIDDING BETWEEN WHEEL AND RAIL OF DIESEL TRACTIVE UNITS AND PREVENTION WITH ANTI-SKID DEVICES [Gleitvorgange Zwischen Rad und Schiene bei Dieseltriebfahrzeugen und Gegenmassnahmen durch Schutzgerate]
Examples are given of the various types of skid phenomena occurring in the operation of diesel traction stock and the effect they have on vehicles. From these the authors derive the requirements for an anti-skid device for use in braking. [German]

Schroter, H Schonenberger, A *Eisenbahntechnische Rundschau* Vol. 23 No. 3, Mar. 1974, pp 86-92, 11 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

02 057501
THE HUNTING STABILITY AND CURVING ABILITY OF RAILWAY VEHICLES
A novel railway suspension system using the principle of diagonal wheel-set guidance in place of the parallel guidance commonly employed has been described in principle for two and three axle bogies (vehicles) and analyzed for curving ability and hunting stability of wheelset and body oscillations, and critical hunting speeds have been determined. It has been shown that body instabilities can be controlled by the use of pseudo-slip damping and/or body suspension damping while wheelset stability can be maintained up to very high operating speeds without any real impairment of the steering ability of the standard rigid railway wheelset having conical or profiled wheel treads. For profiled wheels the ratio between lateral gravitational suspension stiffness and longitudinal suspension stiffness which ensures optimum steering on curved track has been derived.

Scheffel, H (South African Railways) *Rail International* No. 2, Feb. 1974, pp 154-176, 8 Fig., 3 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

02 057864
THE SAFETY AGAINST THE PENDULOUS CAR UPSET
In this paper, the principle and the calculation methods of influence coefficients and danger indices of the pendulous suspension system are described, and the problem of car upset of 381 series pendulous electric cars is examined numerically. It is shown that the pendulum stopper is effective in making the danger index smaller.

Koyanagi, S *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 102-107

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

02 057865
A SIMULATION OF FREIGHT CAR MOTION DUE TO END-TO-END IMPACT
Modernization of the Japanese National Railways freight-transportation system is proceeding rapidly and is demanding better cushioning from car draft gears. This report presents a practical method which numerically simulates freight car motions due to impact, not only between single cars but also between groups of cars under various conditions.

Kobayashi, M *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 96-101, Figs.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

02 071756
THE MOTION OF A RAILWAY VEHICLE PLACED ON ROTATING ROLLERS
An exact theory for the linear motion of a symmetrical railway vehicle placed on rotating rollers is given. Each axlebox can move in longitudinal, lateral and vertical directions with respect to the vehicle frame and the relative displacements are governed by undamped springs providing linear restoring forces. The displacements are supposed to be so small that the equations of motions can be linearised, so that the motion splits up into two mutually independent parts, viz. the symmetrical and the lateral motion. Dimensionless quantities are introduced in such a way that for the lateral motion, which is studied more in detail, the singular perturbation method can be used; the application of this method will be discussed in a forthcoming report. The theory is applied on the case of the ORE test bogie and on that of the 1:5 scale model of the Delft Laboratory of Engineering Mechanics. In the latter case a considerable discrepancy between the theoretical and the experimental results in found.

Groeneveld, PJ de Pater, AD
Delft University of Technology #486, 103 pp, 3 App.

ACKNOWLEDGMENT: Delft University of Technology
PURCHASE FROM: Delft University of Technology Laboratory of Engineering Mechanics, Delft, Netherlands Repr. PC

02 071802
VIBRATIONS OF RAILWAY VEHICLES
The steady state response for model of a six-axle locomotive running on a sinusoidally irregular track has been investigated. In this paper the generalized method of complex algebra is used to obtain the steady state response of the vehicle components to sinusoidal lateral track irregularities with varying frequencies. Two mathematical models for the six-axle locomotive have been set up. A full model for the stationary vehicle, in which slip between wheels and rails and corresponding creep forces are assumed negligible, and a full model for the moving vehicle, in which creep forces and wheel trend profiles are considered.
Fourth Proceedings of the Congress.

Siddall, JN Dokainish, MA ElMaraghy, WH
Canadian Congress of Applied Mechanics Proceeding

ACKNOWLEDGMENT: EI (EI 74 805825)
PURCHASE FROM: ESL Repr PC, Microfilm

02 071803
DYNAMICS OF THE INGLIS RAILROAD TRACK
This paper discusses oscillations of railroad tracks under the action of moving loads. Oscillations of a railroad track in accordance with the Inglis model of a track under the action of a moving, unsprung mass associated with a spring-borne mass and damping influences are first discussed. The differential equation which defines the deformation of the rail under the action of the moving load is derived. The behavior of the system near the instability regions of the Mathieu equation is discussed, and the effects of moving, periodically changing loads on the vibrations of a railroad track are also studied.
Fourth Proceedings of the Congress.

Volterra, E
Canadian Congress of Applied Mechanics Proceeding 2 Ref.

ACKNOWLEDGMENT: EI (EI 74 805826)
PURCHASE FROM: ESL Repr PC, Microfilm

02 071816
AIR RESISTANCE OF THE TRAINS IN A TUNNEL [Der Luftwiderstand der Zuege im Tunnel]
It is shown how the air resistance in a tunnel can be directly derived from the condition of flow obtained when the train passes through the tunnel. An example is presented to demonstrate that the calculated values are in agreement with the actual test results. The formulas for calculating the frictional forces at the tunnel wall and the compressive and frictional forces at the train are given. [German]

Gackenholz, L *Glasers Annalen ZEV* Vol. 98 No. 3, Mar. 1974, pp 79-84, 8 Ref.

ACKNOWLEDGMENT: EI (EI 74 703930)
PURCHASE FROM: ESL Repr PC, Microfilm

02 071830
STRESSES IN RAILROAD TRACK
With the constant tendency in railroad practice to increase the axle loading and the speed of locomotives, the problem of stresses produced in rails by moving loads becomes more and more important. In a study made by engineers of the Westinghouse Electric and Manufacturing Company, principally in connection with the study of the tracking characteristics of electric locomotives, there has been developed a method for experimental determination, not only of vertical but also of lateral forces produced on the rails by a moving locomotive, and it is shown that these lateral forces produce in rails very high stresses. In this paper the authors briefly discuss the theory which has been used as a guide in this experimental research work, and describe some recent experiments in the laboratory and in the field.

Contributed by the Applied Mechanics Division and Presented at the Annual Meeting, New York, N.Y., Nov. 30 to Dec. 4, 1931, of the American Society of Mechanical Engineers.

Timoshenko, S (Michigan University, Ann Arbor); Langer, BF (Westinghouse Research Laboratories)
American Society of Mechanical Engineers AMP-54-26, 1973, 37 PP, 40 Fig., 1 Tab.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

02 071986
SURVEY OF RAILWAY VEHICLE DYNAMICS RESEARCH
Presents a survey of the research concerned with the dynamics of single, conventional railway vehicles. Attention is concentrated on analytical research and only that experimental research that has been performed in conjunction with analytical efforts. The often conflicting objectives for railway vehicle suspension design and the research done to understand the design implications of these objectives are discussed.

Law, EH Cooperrider, NK *ASME Journal of Dynamic Systems, Meas and Control* Vol. 96 No. 2, June 1974, 98 Ref.

ACKNOWLEDGMENT: EI (EI 74 902301)
PURCHASE FROM: ESL Repr PC, Microfilm

02 072473
STABILITY AND RIDING QUALITY OF RAILWAY VEHICLES
The so-called critical speed of a linearized railway vehicle is shown to be no useful measure for the stability of the system in practice. The important interaction between vehicle and track can be taken into account by the riding quality for a certain vehicle on every particular piece of track. The riding quality is determined by the accelerations transmitted to the payload, weighted according to comfort standards, and the relative displacements between wheel and rail. From the riding quality demands both for vehicle design and for maintenance of the track can be derived.

Broersen, PMJ (Delft University of Technology) *Vehicle System Dynamics* Vol. 3 No. 2, Sept. 1974, pp 109-121, 1 Fig., 1 Tab., 6 Ref.

ACKNOWLEDGMENT: Vehicle System Dynamics
PURCHASE FROM: Swets and Zeitlinger BV Amsterdam, Netherlands Repr. PC

02 072485
CURRENT DESIGN ACTIVITIES ON BRITISH RAILWAYS
With the identification of profitable freight areas and the selection of growth traffic has come the need to review in detail the running gear and, in particular, the suspensions of both 4-wheeled and bogie vehicles. This design review has been aimed at ensuring a high-speed capability for all new freight vehicles coupled with safety at all times, low maintenance costs and maximum availability. After reviewing traditional suspensions with respect to their strengths and weaknesses, the paper discusses in detail the philosophy applied in British Railways design offices to new freight running gear. Examples of new development are provided, together with comments on progress to date. This is one of five papers presented at a conference on High-Speed Freight Wagons.
This paper was presented at a conference arranged by the Railway Engineering Group of the Institution of Mechanical Engineers, 16 October 1969.

Thring, JF (British Railways Board)
Institution of Mechanical Engineers Proceeding Vol. 184 No. t3D, 1969, pp 5-14

ACKNOWLEDGMENT: Institution of Mechanical Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072489
WAGON RUNNING GEAR
The paper deals with certain fundamental aspects of wagon design and performance. Torsional rigidity of four-wheel and bogie wagons, forces imposed by the track on the running gear, and the stresses imposed by the vehicle on the track are considered with particular reference to the establishment of an economically justifiable common goal based on all around optimum performance. Bogie rotational resistance, lozenging forces, friction and hydraulic damper

This paper was presented at a conference arranged by the Railway Engineering Group of the Institution of Mechanical Engineers, 16 October 1969.

Koffman, JL (British Railways Board)
Institution of Mechanical Engineers Proceeding Vol. 184 No. t3D, 1969, pp 45-59

ACKNOWLEDGMENT: Institution of Mechanical Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072657
AUTOMATIC PARAMETER IDENTIFICATION APPLIED TO A RAILROAD CAR DYNAMIC DRAFT GEAR MODEL
One of the most important components in simulating track-train dynamics is the mathematical model of the connection between two cars, the draft gear-coupler combination. In this paper an automatic parameter identification technique is presented which can be used to generate a nonlinear functional relationship of dynamic draft gear characteristics using experimental data.

This paper was contributed by the Automatic Control Division of ASME for presentation at the Annual Winter Meeting, 17-22 November 1974, New York, New York.

Ward, ED Leonard, RG (Purdue University)
American Society of Mechanical Engineers No. 74-WA/AUT-1, Jan. 1974, 6 pp, 8 Fig., 11 Ref., 1 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

02 072667
VIBRATION ENVIRONMENT IN FREIGHT CARS AND ITS EFFECT ON DAMAGE TO LADING
In development of suspension systems for freight cars effect on lading should be carefully analyzed. This paper by illustrating how lading reacts to vibration environment stresses the need to reduce the range of frequencies present in the freight car as being of primary importance. It is felt that the present level of accelerations is not excessive and can be considered of secondary importance.

This paper was contributed by the Rail Transportation Division of ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Guins, G Young, E (Lansmont Corporation)
American Society of Mechanical Engineers No. 74-WA/RT-9, July 1974, 5 pp, 10 Fig.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

02 072670
RAILWAY TRUCK RESPONSE TO RANDOM RAIL IRREGULARITIES
This paper discusses the random response of a seven degree of freedom passenger truck model to lateral rail irregularities. Power spectral densities and root mean square levels of component displacements and contact forces are reported. The truck model used in the study allows lateral and yaw degrees of freedom for each wheelset, and lateral, yaw and roll freedoms for the truck frame. Linear creep relations are utilzed for the rail-wheel contact forces. The lateral rail irregularities enter the analysis through the creep expressions. The results described in the paper were obtained using frequency domain techniques to solve the equations of motion. The reported results demonstrate that the guidance force needed when traveling over irregular rail at high speed utilizes a significant portion of the total available tangential force between wheel and rail.

This paper was contributed by the Rail and Transportation Division of ASME for presentation at the Winter Annual Meeting, 17-22 November 1974. New York, New York,

Cooperrider, NK (Arizona State University)
American Society of Mechanical Engineers No. 74-WA/RT-2, Sept. 1974, 8 pp, 11 Fig., 16 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

02 072766
WHEELSET STEERING FOR BOGIES OF RAILWAY VEHICLES
Examined are steered wheelsets as a means of reducing tread, flange and railhead-contact wear and of minimizing derailment tendencies. Longitudinal and lateral sliding resistances of leading and trailing wheelsets are discussed and the moving of the friction force center to coincide with the trailing wheelset is shown to reduce lateral sliding resistance to zero. Described are wheelset pivoting arrangements which greatly reduce flange wear and are reported to be highly satisfactory in service.

Schwanck, U *Rail Engineering International* Vol. 4 No. 8, Oct. 1974, pp 352-359, 18 Fig.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072776
WHEEL/RAIL ADHESION: ITS RELATION TO RAIL CONTAMINATION ON BRITISH RAILWAYS
Experiments with oils and water deposited on rails have been carried out. In dry weather adhesion depends on the quantity of oil present, which normally is so small it affects friction by a boundary lubrication mechanism. Evidence suggests that water reduces adhesion from two causes. On debris-free rails it acts as an additional boundary lubricant. With debris present it forms a low shear strength mixture which, in minimally wet conditions, remains on the wear band where wheels contact the rail. In steady rain the debris mixture is squeezed aside and adhesion is possibly improved. In dry weather, debris particles have apparently little influence on the overall adhesion coefficient.

Broster, M (British Railways Board); Pritchard, C Smith, DA *Wear* Vol. 29 No. 3, Sept. 1974, pp 309-321, 14 Ref.

ACKNOWLEDGMENT: EI (EI 74 072837)
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072781
INVESTIGATION OF OPTIMUM ALGORITHMS OF CONTROL OF FREIGHT TRAINS [Issledovanie Optimal'nykh Algoritmov Upravleniya Gruzovym Elektrovozom]
Formulas obtained on the basis of the maximum principle are presented for linearized characteristics of a train. A program is proposed for the calculation of the parameters of the optimal, from the point of view of energy, velocity curves at the constant profile sector for a set time of run. The effect of the conditions of motion on the character of optimum laws of control of electric locomotives is analyzed. [Russian]

Gritskevich, AE *Izvestiia Vysshikh Ucheb Zaved, Elektromekhanika* No. 6, June 1974, pp 675-680

ACKNOWLEDGMENT: EI (EI 74 069551)
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072809
STEADY-STATE MOTION OF RAILWAY VEHICLES ON CURVED TRACK
A simplified linear theory of steady-state curve traversing is developed for truck and two axled vehicles. The approach is based on providing guidance by creep forces in conjunction with wheel conicity, so that flange contact is normally avoided. It is shown that this approach is realistic for a wide range of vehicle and track parameters. However, steering by creep forces is limited by the onset of wheel slip. Representative experimental results for a two-axled vehicle are presented.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Boocock, D *Journal of Mechanical Engineering Science* Vol. 2 No. 6, Dec. 1969, pp 556-566

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072821
WHEEL AND RAIL LOADINGS FROM DIESEL LOCOMOTIVES
This presentation was prepared to review Electro-Motive Division's background, particularly regarding locomotives in the area of wheel-to-rail loadings as they affect maintenance, wear, and potential train derailments. This review is divided into the following six areas: sample derailment data; basic curve negotiation mechanics; experimentally determined wheel-to-rail forces; rail profile data; the effect of dynamic brake levels; and mechanical considerations.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration. The report was presented at the AREA Convention, Chicago, Illinois, 1971.

Koci, LF Marta, HA
General Motors Corporation 1971, 15 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072824
CONTACT VIBRATIONS
When a wheel rolls on a rail with a randomly wavy surface, the random waviness gives rise to a displacement input to the wheel and rail with a significant high-frequency (f greater than 100 HZ) spectral content. This displacement input excites the contact resonance of the system, wherein the mass of the wheel and an "equivalent mass" of the rail vibrate on the nonlinear contact spring. The purpose of the paper is to develop an analytical model for these high-frequency contact vibrations. The wheel is assumed to undergo only rigid-body motions, apart from the localized elastic deformation near the contact region. The rail is modeled as an infinite beam on a continuous, point-reacting foundation. With the rail roughness being assumed to be a locally stationary, Gaussian random process, a complete solution is presented to the linearized problem. Three phenomena of interest are investigated in detail: plastic deformation, loss of contact, and the formation of corrugations on the rail. The effects of various wheel and rail parameters on these phenomena are explored.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Nayak, PR *Journal of Sound and Vibration* Vol. 28 No. 2, 1973, pp 277-293

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072842
SOME ASPECTS OF THE INTERACTION BETWEEN RAILWAY VEHICLE AND TRACK
This paper describes aspects of experimental research on the South African Railways into the conditions affecting the riding quality of railroad vehicles. Parameters which influence the vertical riding quality of railway vehicles are given against the theory of forced vibrations. Results recorded during riding quality tests were found to be in good agreement with the theory. A method of simulating vertical oscillations of railway vehicles on a digital computer is outlined.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Labuschagne, TJ Scheffel, H (South African Railways) *Civil Engineer in South Africa* Vol. 11 No. 10, Oct. 1969, pp 247-252

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

02 072938
A METHOD FOR THE MEASUREMENT AND ANALYSIS OF RIDE VIBRATIONS OF TRANSPORTATION SYSTEMS
The measurement and recording of ride vibrations which affect passenger comfort in transportation systems and the subsequent data-reduction methods necessary for interpreting the data present exceptional instrumentation requirements and necessitate the use of computers for specialized analysis techniques. This paper presents a method for both measuring and analyzing ride vibrations of the type encountered in ground and air transportation systems. A portable system for measuring and recording low-frequency, low-amplitude accelerations and specialized data-reduction procedures are described. Sample vibration measurements in the form of statistical parameters representative of typical transportation systems are also presented to demonstrate the utility of the techniques.

Catherines, JJ Clevenson, SA Scholl, HF
Langley Research Center, (L-8206) Tech. Note NASA TND-6785, May 1972, 30 pp, 18 Fig., 10 Ref.

ACKNOWLEDGMENT: National Aeronautics and Space Administration
PURCHASE FROM: NTIS Repr. PC, Microfiche
N72-24939, DOTL NTIS

02 072956
A NEW DESIGN APPROACH FOR RAILWAY VEHICLE SUSPENSION
Two new vehicle suspension designs which resolve the conflicting requirements for hunting stability and curving ability of railway vehicles in an uncompromising manner are described and analyzed. These designs are the diagonal wheelset suspension and the negative wheelset yaw suspension systems. Design details and test results are given, particularly for the diagonal suspension system which has been extensively tested.

Scheffel, H (South African Railways) *Rail International* No. 10, Oct. 1974, pp 638-651, 6 Fig., 7 Phot., 2 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

02 080094
DYNAMIC INTERACTION BETWEEN VEHICLES AND GIRDERS IN HIGH SPEED RAILWAYS
In this report, two types of analytical vehicle models are dealt with—two-axle truck car which is analogous to the Shin-Kansen vehicle, and a vehicle with a distributed suspension system corresponding to the magnetically levitated vehicle which is being planned for in the future. The dynamic response of railway bridges under passage of trains has been studied for many years. As part of the study of the practicability of a new type railway with a levitation system, the dynamic response of the guideway structure is one of the fundamental problems. Various comparisons of loading for the conventional and exotic vehicle are compared with respect to speed and span length.

Matsuura, A *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 133-136, 6 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

02 080130
TRACK TRAIN DYNAMICS TO IMPROVE FREIGHT TRAIN PERFORMANCE
This manual is intended to produce guidelines related to freight train operation which are based upon the results of analysis of the current operating policies and practices of North American railroads. It is intended that the guidelines be accepted only at the discretion and volition of individual railroad managements. No rule making is intended, implied or contained and therefore none of the suggested guidelines supplant existing laws, rules or regulations. Every practical effort was made to insure that this manual is comprised of technically competent material. A committee representing many disciplines including air brake operations, train handling, general transportation operations, engineering maintenance of way, locomotive maintenance and car design was established to review the guidelines in their entirety. Many of the guideline procedures in which there were more than one possible option or that were of a controversial nature as to their effectiveness were further investigated through actual testing of the air brake functions and procedures on a manufacturer's Air Brake Rack and it is recommended that further testing be accomplished

with train simulators and instrumented trains. Although not an exacting analysis, these tests did assist in supporting or proving many of the procedures. It is expected that further research will be accomplished by the recipients of the guideline manual and the improved methods incorporated into the manuals.

Association of American Railroads Research Center R-122, 1973, 310 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

02 080298
REPORT ON COMPUTER DERAILMENT STUDY. PHASE 08 REPORT
Train accidents involving cars carrying hazardous materials have been the cause of substantial losses in recent years. This is a source of great concern to carriers, owners, and government agencies. When a derailment takes place, little is known of the phenomenon of car behavior immediately thereafter. All that is known are the end results. Inasmuch as car derailments cannot be practically duplicated in the laboratory, an analytical approach is the obvious method to use in obtaining data on derailment behavior. The objective of this study is to set forth a mathematical model to find the motions, forces and accelerations experienced by the derailed cars at each instant of time in the train derailment. The information obtained can offer a promising path to evaluate car design and train makeup as related to derailment losses. In this theoretical analysis of the derailment, the equations of motion for each derailed car are derived in general in the horizontal plane. These are then coupled with a system of constraint equations and the equation of motion for the non-derailed cars. The equations are then solved numerically (by digital computer) in their non-linear forms with the first car derailed as the sole initially assumed conditions; the ground friction, mating coupler moment and brake retarding forces are in action accordingly. A total of twenty-six (26) simulations were run to show the influence of variables on derailment behavior over a range of feasible train design parameters.

Phillips, EA
(RA-081-12) R-135, Feb. 1972, 72 pp, 30 Fig., 2 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

02 080315
QUASI-STATIC DISTRIBUTION OF BRAKING AND STARTING FORCES IN RAILS AND BRIDGE
An idealized model of a system of elastically connected bars was set up for the solution of the effect of braking and starting forces in railway bridges. The quasi-static method is based on the assumption that the greatest horizontal external forces are equal to the product of vertical forces and of the coefficient of adhesion. The system of governing differential equations is solved and the theoretical results are compared with experiments. The effect of certain parameters (e.g. of the active rail length, of the horizontal elastic foundation, of the coefficient of adhesion, of the bridge span, etc.) is studied in detail.

Fryba, L (Railway Research Institute, Czechoslovakia) *Rail International* No. 11, Nov. 1974, pp 698-716, 30 Fig., 3 Tab., 10 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

02 080341
TRAIN TRACK DYNAMICS-GUIDELINES FOR: TRAIN HANDLING, TRAIN AND STRUCTURE, ENGINEER EDUCATION
The abstract of guidelines taken from Track Train Dynamics Manual indicates factors in four areas which are important in improving the performance of freight trains.

An RPI-AAR cooperative program. See 080130.

Association of American Railroads Research Center, (R-153) R-122(73T 0252), 1973, 83 pp, 29 Fig.

ACKNOWLEDGMENT: Association of American Railroads Research Center
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

02 080352
APPLICATION AND OPERATING EXPERIENCE OF RUBBER SUSPENSION ON RAIL VEHICLES [Anwendung und Betriebserfahrung mit Gummifedern bei Schienenfahrzeugen]
Experience with a large number of city, suburban and main line coaches and locomotives has shown the use of well developed rubber suspension designs to be of benefit as far as riding qualities and maintenance demands are concerned and that the development of suitable designs should result in further simplification. [German]

Koffman, JL (British Railways Board); Reed, AJ *Glasers Annalen ZEV* Vol. 98 No. 7-8, July 1974, pp 219-226, 9 Ref.

ACKNOWLEDGMENT: EI (EI 74 078221)
PURCHASE FROM: ESL Repr. PC, Microfilm

02 080353
PREPATORY WORK AND THE FIRST PHASE OF TEST IMPLEMENTATION FOR THE STUDY OF RAIL RAPID TRANSIT [Vorberitung und Durchfuehrung der Versuche fuer Schienenschnellverkehr]
As part of a research program dealing with the limits of the wheel/rail system, tests were carried out on the German Federal Railway's test rack by means of a locomotive-hauled test train (locomotive 103 118 and 3 test cars) in the speed range above 200 km/hr. These successful test runs provided the basis on which systematic component research is being continued. [German]

Haefner, F Hasselhuhn, J Weidlich, E *Glasers Annalen ZEV* Vol. 98 No. 9, Sept. 1974, pp 299-309, 6 Ref.

ACKNOWLEDGMENT: EI (EI 74 080411)
PURCHASE FROM: ESL Repr. PC, Microfilm

02 080360
RIDE QUALITY-AN INCREASINGLY IMPORTANT FACTOR IN TRANSPORTATION SYSTEMS
A portable data acquisition system has been developed and used to obtain field test data on a number of air and ground vehicles. Automatic data reduction techniques have been utilized, and developed where necessary, to present the measured data in useful, concise form. The vibration data parameters found to be of significant value include power spectral density distributions and frequency-of- occurrences of given levels of vibration. Vibrations in the lateral and vertical degrees of freedom appear to have significant influence on ride comfort at vibration levels as low as, or lower than, 0.lg acceleration. Vibration environments for the various type vehicles tend to be random in nature with the vibrational energy concentrated in the frequency range below 15 Hz and with a significant amount below 1 Hz, which is the region generally associated with motion sickness. For a train, subjective ride discomfort observations could be reasonably well correlated with peak lateral vibrations. This correlation formed the basis of a trial program of using vibration measurements as a quantitative index for identifying sections of rough track which could benefit from maintenance. Of all vehicles studied, the jet transport had the lowest vibration environment.

Presented at the 1971 International IEEE Conference on Systems, Newtorks, and Computers, Oaxtepec, Mexico, January 19-21, 1971.

Conner, DW (Langley Research Center)
Institute of Electrical and Electronics Engineers Jan. 1971, 5 pp, 9 Fig., 2 Tab., 5 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: IEEE Repr. PC

02 080361
LONGITUDINAL TRACK-TRAIN DYNAMICS: A NEW APPROACH
Using a measured functional relationship for draft gear characteristics a nonlinear model is developed to predict the coupler forces between cars of a railroad train. The model is then simplified, using modal expansion, to effect an economy of digital computation time.

Genin, J Ginsberg, JH Ting, EC (Purdue University) *ASME Journal of Dynamic Systems, Meas and Control* Vol. 96 No. 4, #74-WA/Aut-6, Ser G, Dec. 1974, pp 466-469

ACKNOWLEDGMENT: ASME Journal of Dynamic Systems, Meas and Control
PURCHASE FROM: ESL Repr. PC, Microfilm

02 080772
TRAIN HANDLING AND OVERTURNED RAIL
The Canadian Pacific Railway recently used the EMD's dynamometer car to explore the problem of harmonic roll and over-turned rail. The problem is particularly bad in the Rockies. The tests indicated several methods by which train handling procedures could be improved to reduce the chance of a derailment.

Progressive Railroading Vol. 17 No. 8, Aug. 1974, pp 33-34

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

02 081275
VERTICAL VIBRATIONS OF VEHICLES WITH PRIMARY AND SECONDARY SUSPENSIONS [Sur les vibrations verticales d'un vehicule comportant deux etages de suspension]
This doctorate's thesis is a mathematical study of the dynamic behavior of a rail vehicle: it examines the vibratory system constituted by the underframe resting on elastic supports with two-tier suspension, and discusses the equation models and results calculated by means of a digital computer. Study of the curves reproduced on tracing tables, and of the influence of the different vehicle-construction parameters makes it possible to assess the incidence of the geometrical characteristics of a steel body, the influence of the suspension on vertical behavior and the desirable damping value for optimizing passenger comfort. [French]

Richard, J
Universite de Paris Sud Vol. 1 1972, 61 pp, Figs., 16 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 907)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

02 081783
TRACK TRAIN DYNAMICS. HARMONIC ROLL SERIES—VOLUME I
This is the first of two installments of the report marking completion of Task 13 of Phase I of the International Government-Industry Research Program on Track Train Dynamics. The many factors of track, equipment and operations which are involved in harmonic roll of railroad equipment, a phenomenon also known as "rock and roll," are identified. The volume has five sections: Problem Definition, Historical Background, Current Industry Practices, Recommended Guidelines, and Bibliography. Definitions of significant terms are also included in this manual.

This project was sponsored by the Association of American Railroads, the Federal Railroad Administration, the Railway Progress Institute and the Transportation Development Agency of Canada.

Association of American Railroads Research Center Vol. 1 1974, 79 pp, 7 Fig., 16 Ref., 2 App.

PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

02 081784
TRACK TRAIN DYNAMICS. HARMONIC ROLL SERIES-VOLUME II
This is the second of two installments of the report marking completion of Task 13 of Phase I of the International Government-Industry Research Program on Track Train Dynamics. This reference manual has data on truck components and on truck characteristics and is based on work performed by American Steel Foundries. Included are reports on frictional damping forces at the side frame/truck bolster interface; vertical, lateral, torsional and pitch spring rates of standard truck coil springs; deflection characteristics of truck bolsters and side frames; torsional resistance at the truck bolster/carbody centerplate interface; theoretical clearances throughout the truck; and mass moment of intertia of the side frame and truck bolster.

This project was sponsored by the Association of American Railroads, the Federal Railroad Administration, the Railway Progress Institute and the Transportation Development Agency of Canada

Association of American Railroads Research Center 1974, 92 pp, 61 Fig.

PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

02 082174
TRACK TRAIN DYNAMICS. ACCIDENT INVESTIGATION
This manual, a report marking the completion of one assignment of the International Government-Industry Research Program on Track-Train Dynamics, is a guide to systematic investigation of any derailment in order to establish a cause, or combination of causes. It presents information stressing the close relationships between track, train and vehicle characteristics, train handling, and track-train dynamics. Stressed is the need to recognize that a derailment may be combination-caused, rather than mandating the investigators to report a single cause. This is necessary if information from the accident investigation is to accurately reflect the true situation. The manual concludes with six recommendations for individual railroad users.

This project was sponsored by the Association of American Railroads, the Federal Railroad Administration, the Railway Progress Institute and the Transportation Development Agency of Canada.

Association of American Railroads Research Center 1974, 77 pp, Figs.

PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 052509
ELASTIC SYSTEM FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTER BUFFERS). STUDY OF LOAD PROTECTING DEVICES FOR PALLETISED LOADS THROUGH BUFFING TESTS.
The report contains a description of the various load protecting systems (with the exception of impact dampers with long stroke) for palletised loads in order to prevent damage. The systems studied can be subdivided into two groups, according to their operating principles, consisting in: (1) the creation of a rigid load forming a solid assembly with the wagon, to avoid any impact effects between wagon and load; (2) the dissipation of energy by the sliding of the load under simultaneous elastic storing of the impact energy. The tests have shown very clearly that the principle of the sliding load, for damage prevention does not lead to the desired effect in the case of palletised goods. Owing to the shifting of the various load tiers relative to each other and also because of parts of the load fallen from the pallets, difficulties are encountered during unloading using fork lift trucks, or this unloading procedure will even become impossible. The principle, consisting in the creation of a rigid load, forming a solid assembly with the wagon (Daberkow System with pre-loading of the goods through air cushion and the system with movable rigid partitions), gave good results during the buffing tests. However, the system based on the use of movabale rigid partitions has not yet reached its final stage of perfection and the performance of this system during the run could not yet be verified. The practical experience obtained from the Daberkow system hitherto has shown that the pre-loading also prevents the lateral sliding of the loads during conveyance.

International Union of Railways B36/RP10/E, Apr. 1973, 38 pp, 44 Fig., Tabs., 6 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052515
ROLLER BEARING AXLEBOXES AND AXLES. RECOMMENDATIONS CONCERNING THE MAINTENANCE RULES AND FREQUENCIES FOR ROLLER BEARING AXLEBOXES OF GOODS WAGONS
Following an enquiry conducted on the different Member-Administrations of ORE concerning the maintenance rules and maintenance frequencies for roller bearing axleboxes of goods wagons, the ORE B95 Committee considered it possible to present some uniform proposals concerning the question of maintenance. Taking into account the results of the investigations and tests carried out especially concerning greases, the Committee proposes that, subject to certain conditions, the periodical maintenance of roller bearing axleboxes should only be carried out during every other wagon overhaul i.e. at intervals of at least 8 years for current types of wagons. These proposals offer, for the greater part of the Railway Administrations, the advantage of achieving substantial savings without harming the quality of the service or the operational safety of the goods traffic.

International Union of Railways B95/RP 3/E, Oct. 1972, 22 pp, Tabs., 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052524
DISTRIBUTION OF THE TEMPERATURE IN ICE COOLED OR MECHANICALLY REFRIGERATED VEHICLES. DIFFERENT BUNKER ARRANGEMENTS IN ICE COOLED VANS
In order to compare the cooling effect of different ice bunker arrangements, cooling down and steady state cooling tests were made in DB ice cooled refrigerator vans. The vans contained a simulated load. The ice bunker arrangements tested were: (1) full length end wall bunkers; (2) end wall bunkers filled in their upper half only; and (3) roof mounted bunkers. Forced ventilation was provided in the first two cases but the van with roof mounted bunkers relied on natural convection ventilation. The half filled end wall bunkers gave the practically same cooling effect as full depth bunkers, although with a reduced duration before refilling would be necessary. The roof bunker arrangement without forced ventilation was unable to provide adequate cooling of the load.

International Union of Railways B127/RP 1/E, Apr. 1973, 17 pp, Figs., 5 Tab., 9 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052527
STANDARDIZATION OF AIR CONDITIONING AND HEATING INSTALLATIONS. UNCONVENTIONAL AIR CONDITIONING SYSTEMS FOR RAILWAY SERVICE
In the present report 5 different air conditioning systems or cooling units, installed either tentatively in railway vehicles or introduced in other fields of application (road transport vehicles and aircraft) are described. After a short description concerning the design and operation, each of the various systems is compared with the conventional compressor system and the various advantages and drawbacks are demonstrated. No recommendation is made for the general application in RIC coaches, because none of the systems, when considered in their entirety, are more advantageous than the conventional system. In the appendices added to the report, some of these systems are described in detail.

International Union of Railways B107/RP 3/E, Apr. 1973, 26 pp, Figs., Tabs., 4 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052529
PROTECTION OF MATERIALS. SPECIFICATIONS FOR THE PAINTING OF WAGONS AND CONTAINERS. SPECIFICATION COVERING THE PROTECTION AGAINST CORROSION AND THE PAINTING OF PASSENGER COACHES AND TRACTIVE UNITS. QUALITY TESTING OF PAINT SYSTEMS APPLIED TO RAILWAY VEHICLES
This report gives specifications for the painting of wagons and containers. Special mention is made of the different products to be employed, surface preparation, application of paint and the guarantee. This report represents the revision of UIC Leaflet 842-1.

International Union of Railways E17/RP36, 37, 38/E, Oct. 1973, 48 pp, Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052543
STANDARDISATION OF WAGONS. FLAT BOGIE WAGON, TYPE 1
The present report describes the design of the standard flat bogie wagon, type 1, and contains the results of the tests carried out in accordance with ORE Report B12/RP 17.

International Union of Railways B12/RP 20/E, Oct. 1973, 11 pp, Figs., Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052544
STANDARDISATION OF WAGONS. OPEN BOGIE WAGONS
This report describes the design of the open bogie wagon and contains the results of the tests covered by ORE Report B 12/RP 17.

International Union of Railways B12/RP 21/E, Oct. 1973, 9 pp, Figs., Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052545
VIENNA ARSENAL VEHICLE TESTING STATION. REPORT ON TESTS DURING 1972 AND 1973 BEFORE RECONSTRUCTION
A description of the Vehicle Testing Station at Vienna Arsenal, indicating its present and future capabilites, together with a summary of the activities of 1972 and of 1973 until the closure for reconstruction is given. Standard test programmes for passenger coaches and refrigerator vans are described briefly. Tests were undertaken on coaches, wagons, containers and locomotives of many types, and in addition the facilities of the station were used in icing tests on the catenary, aerodynamic tests on a scale-model of a building development, and aerodynamic tests on bob-sleighs. Further work was done for the European Airbus group.

International Union of Railways AZ 30/RP 13/E, Oct. 1973, 53 pp, 15 Fig., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052549
PROBLEMS RAISED BY THE APPLICATION OF THE AUTOMATIC COUPLER TO LOCOMOTIVES. ENQUIRY REPORT
This report contains information provided by some ORE Member-Administrations about the problems raised by the application of the automatic coupler to locomotives and the solutions envisaged, particularly as regards the modification of locomotives which will continue to be used after the automatic coupler has been fitted on wagons in international service. It deals in particular with: (1) the characteristics to be adopted for the elastic element and its technical features; (2) the possibility of using a short arm and the problems which this will pose for the suspension and in curve negotiation; (3) the methods adopted for making the underframe suitable for taking the automatic coupler; (4) problems connected with heating (steam and electric); and (5) the mixed coupler.

International Union of Railways S1001/RP 2/E, July 1972, 22 pp, Figs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052550
EXAMPLES OF THE APPLICATION OF THE AUTOMATIC COUPLER TO LOCOMOTIVES (IN SERVICE OR TO BE BUILT)
The solutions adopted for rendering existing locomotives suitable for receiving the automatic coupler are very diverse. The information supplied by the Administrations on this point has been assembled. This has been supplemented by information concerning the solutions retained for locomotives still to be constructed.

International Union of Railways S1001/RP 3/E, Oct. 1973, 11 pp, Figs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052551
STANDARDISATION OF WHEEL PROFILES. RECOMMENDATIONS CONCERNING A UNIVERSAL WHEEL PROFILE ADAPTED TO WEAR (UIC/ORE PROFILE) VALID REGARDLESS OF THE WHEEL DIAMETER AND THE TYPE OF VEHICLE
Following the studies carried out by a special group of "Rolling Stock" and "Track" Specialists, a "standard profile adapted to wear" has been developed. This profile, called the "UIC/ORE profile", does not constitute a compromise but, on the contrary, combines the best elements of the existing profiles. Together with the appropriate justifications and arguments, the present report gives the geometrical values recommended for the shape of the flange and for the outer part of the tread, the mathematical representation of the standardized profile, and the recommendations for its practical application. The "UIC/ORE profile" is valid regardless of the wheel diameter (ranging from 1000 mm to 330 mm for trailer stock) and the type of vehicle. In the opinion of the Specialists, it permits speeds of up to 140 km/h to be attained for old types of non-bogie vehicles and bogie vehicles, and 160 and even 200 km/h for vehicles equipped with modern bogies. The adoption of this "adapted wear profile", combined with the use of wheels with treated rim (see Report B 98/RP 9), should permit the greater part of the Administrations to achieve substantial economies (materials, staff, machine-tools, vehicle stoppages,...) due to the reduction in the number of re-profilings and the elimination of flange-wear.

International Union of Railways S1002/RP 2/E, Apr. 1973, 32 pp, Figs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052552
STANDARDIZATION OF THE ELECTRICAL EQUIPMENT OF PASSENGER COACHES. TESTS TO DETERMINE THE LOADING CAPACITY OF THE MAIN HIGH-VOLTAGE LINE AS A FUNCTION OF THE OUTSIDE TEMPERATURE
This report shows the results of tests to determine the loading capacity of the various component parts of the main high voltage line, such as coupling plug and socket, material of conductors depending on the outside temperature and the conclusions inferred. The tests were carried out at outside temperatures between minus 20 C and plus 50 C and at current intensities of 400 to 800 A (individual tests even up to 1000 A). Based on the results of the individual tests, a diagram has been plotted concerning the possible loading capacity of the main high voltage line depending on the outside temperature.

International Union of Railways B108/RP 2/E, Apr. 1974, 20 pp, 40 Fig., 1 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052553
STANDARDISATION OF WAGONS. PROGRAMME OF TESTS TO BE CARRIED OUT ON WAGONS WITH STEEL UNDERFRAME AND BODY AND SUITABLE FOR BEING FITTED WITH THE AUTOMATIC BUFFING AND DRAW COUPLER
This report replaces the previous B 12/RP 17 report, 1st edition. It surveys all the tests which are at present considered as representing the complete series of tests to which a new type of wagon can be exposed. The conditions under which these tests should be made and the results to be obtained (maximum or minimum values) are laid down for each test. On account of the detailed information, it contains taking into consideration the developments which have taken place the last few years in the construction of goods wagons, this report constitutes a valuable basis for the design of new types of wagons.

International Union of Railways B12/RP 20/E, Oct. 1973, 11 pp, Figs., Tabs., 6 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052554
STANDARDISATION OF THE ELECTRIC EQUIPMENT OF PASSENGER COACHES. ENERGY SUPPLY SYSTEMS FOR AIR-CONDITIONED PASSENGER COACHES
The following report contains a theoretical comparison between the three-phase and direct current supply systems used on air-conditioned RIC passenger coaches. The comparison on a merely theoretical basis speaks in favour of the direct current supply system. However, certain line tests have shown that theoretical considerations alone are not sufficient to enable an unambiguous choice in favour of one of the two systems to be made. It is therefore recommended that more accurate tests should be carried out in the climatic chamber at Vienna Arsenal under equal environmental conditions with comparable passenger coaches, containing identical equipment and possessing the same features, and, above all, air-conditioning systems bringing the same refrigeration and heating output. Not until then could the study of the question of a standardized energy supply system be resumed. In conclusion, attention is drawn to the need for including the application of static converters in the future study programme.

International Union of Railways B108/RP 1/E, Apr. 1974, 27 pp, 5 Fig., 2 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052556
ELASTIC SYSTEMS FOR TRACTION AND SHOCK GEAR (SIDE BUFFERS AND CENTRE BUFFERS). TESTS WITH LONG-STROKE SHOCK ABSORBING SYSTEMS
Impact dissipating systems with mechanical and hydraulic shock absorbing systems (combined with pneumatic and conventional springs) have been developed for the protection of light vehicles and sensitive loads (carrying wagons with containers). Tests made by the NS and DB with two-axled wagons and bogie wagons aimed at the investigation of the efficiency of the different systems regarding the magnitude of the acceleration with lightly loaded wagons and at that of the limit of the work absorption capacity during impacts between fully loaded wagons. The results show that, whereas mechanical shock absorbing systems have to be excluded from the range of protective systems because their work absorption capacity is too low, hydraulic systems with a stroke of 500 mm have been found adequate for bogie wagons at buffing speeds up to 15 km/h and

consequently fulfill ISO conditions. Systems with a stroke of 760 mm have proved adequate for two-axled wagons in any case, though systems with a stroke of 500 mm have not done so.

International Union of Railways B36/RP 11/E, Oct. 1973, 40 pp, 64 Fig., 3 Tab., 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052586
STANDARDIZATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. EFFECT OF WIND ON THE STABILITY OF LARGE CONTAINERS
In strong winds empty containers are in danger of tipping over because of their large wall areas together with a low specific mass. The results of wind tests carried out in wind tunnels and on the track provide indications concerning the critical conditions of such overturning. This report also outlines recommendations on the measures to be adopted in the transport of large containers on wagons and in stacking them.

International Union of Railways B112/RP 7/E, Oct. 1973, 23 pp, 11 Fig., 1 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052587
STANDARDIZATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. LOCATING AND SECURING SYSTEMS FOR LARGE CONTAINERS ON CONTAINER CARRYING WAGONS
This report gives a general survey of the bases adopted for the work and describes the studies required in connection with the standardisation of locating and securing systems.

International Union of Railways B112/RP 8/E, Oct. 1973, 16 pp, 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 052588
STANDARDIZATION OF LARGE CONTAINERS AND LARGE CONTAINER WAGONS. 60' WAGON FOR CARRYING LARGE CONTAINERS IN LINER TRAINS
This report outlines the principles of work and covers the work shown necessary for the standardisation of this type of wagon. A description of the design and also drawings are provided, together with a summary of the tests carried out and of the criteria adopted in deciding upon the standard wagon.

International Union of Railways B112/RP 9/E, Oct. 1973, 15 pp, Figs., Tabs., 4 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

03 057332
TRUCK SWINGS AWAY FROM HUNTING
One of the developments that has already proved that it is capable of coping with the new generation of problems of truck stability is the swing motion truck. Outwardly, it is difficult to distinguish if from the conventional four-wheel swivel truck. Yet, it does have a unique design of its own. That design enables the side frame and bolster combination to absorb within itself the dynamic conditions that cause truck hunting and rock-and-roll. It accomplishes this with light or loaded cars and at the full range of operational speeds, up to and over 90 mph. The "swing motion" that is imparted by the design itself results in certain critical components working in harmony rather than wearing or pounding against one another.

Progressive Railroading Vol. 17 No. 7, July 1974, pp 36-38, 1 Fig., 4 Phot.

ACKNOWLEDGMENT: Progressive Railroading
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

03 057342
TESTING AND DEVELOPMENT OF THE HST
Although industrial action has precluded running with fare paying passengers, the prototype HST has run about 80,000 miles on test. Running trials have encompassed almost every item of the train's equipment. On test, accelerations from rest with a full train of seven vehicles were better than those predicted at the design stage.

This article contains points from a paper delivered by Mr. B.G. Sephton, Traction Design Engineer for British Railways, to the Railway Division of the Institution of Mechanical Engineers on April 22, 1974.

Modern Railways Vol. 31 No. 309, June 1974, pp 244-245, 1 Phot.

ACKNOWLEDGMENT: Modern Railways
PURCHASE FROM: XUM Repr. PC

03 057405
SIMPLIFIED AUTOMATIC COUPLINGS FOR THE RAILROAD ROLLING STOCK OF IRON AND STEEL PLANTS [Attelage automatique simplifie destine aux vehicules ferroviaires des usimes siderurgiques]
The new coupling and the tests having led to its development and adoption by steel plants and other railway systems are described. The development work was a joint French and German project. Numerous drawings illustrate the report. [French]

Salmon, P *Revue de Metallurgie* Vol. 71 No. 2, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 606543)
PURCHASE FROM: ESL Repr PC, Microfilm

03 057412
ANTIFRICTION BEARINGS FOR HIGH-SPEED MEANS OF TRACTION [Cuscinetti a rotolamento per mezzi di trazione ad elevata velocita]
Antifriction axle and motor bearings for high-speed locomotives and rail motor cars traveling at velocities up to 400 km/h are considered. Conditions of rotation and lubrication and some types of axle bearings and their lightweight designs are discussed. Devices to ensure safety, control and maintenance of the car bearings are briefly considered. [Italian]

Giaccone, G (Villar Perosa) *Ingegneria Ferroviaria* Vol. 28 No. 10, Oct. 1973

ACKNOWLEDGMENT: EI (EI 74 604265)
PURCHASE FROM: ESL Repr PC, Microfilm

03 057414
DESIGN OUTLINES FOR A NEW RAILROAD CAR [Indirizzi progettativi per un nuovo veicolo ferroviaro]
A schematic description is given of a new railroad car designed by Fiat, Turin, with simplified construction of the bogies and the body, elimination of primary suspension and elimination of the axles by suspending the body on four supports, etc. Characteristic advantages of the new car are enumerated, such as serial production of particular units, decrease of weight by 9 tons, increase in the riding comfort, elimination of some vibrations, etc. A comparison with the traditional car is given. [Italian]

Panagin, R (Fiat Company, Italy) *Ingegneria Ferroviaria* Vol. 28 No. 10, Oct. 1973

ACKNOWLEDGMENT: EI (EI 74 604263)
PURCHASE FROM: ESL Repr PC, Microfilm

03 057419
MODERN REALIZATIONS AND ORIENTATIONS IN THE DEVELOPMENT OF RAILROAD ROLLING STOCK [Moderne realizzazioni ed orientamenti nello sviluppo del material mobile ferroviario]
New developments in the rolling stock design for the Italian State Railways since 1969, in particular the locomotives E444, E656, E666, the application of electronic equipment for electric traction purposes, different types of rail motor cars, passenger cars, communication systems, etc., are described. [Italian]

Bolognini, C *Ingegneria Ferroviaria* Vol. 23 No. 10, Oct. 1973

ACKNOWLEDGMENT: EI (EI 74 604258)
PURCHASE FROM: ESL Repr PC, Microfilm

03 057420
PNEUMATIC DOOR OPENING MECHANISM WITH MANUAL OVERRIDE FOR ORE BULK FREIGHT RAILROAD CARS
[Pneumatisko rucni mehanizam za otvaranje i zatuaranje vrata vagona za prevoz rude]
Description of the door actuating mechanism is given with experimental results verified in practical applications.

Stojicic, SS
International Federation for Theory of Mach & Mech Symp. Proc

ACKNOWLEDGMENT: EI (EI 74 603971)
PURCHASE FROM: ESL Repr PC, Microfilm

03 057422
METHOD FOR DESIGN OF STRUCTURAL CHANGES OF RAILROAD CARS [O jednom metodu za rekonstrukciji zeleznickih vagona]
Design criteria for an improvement of railroad cars to be used for higher speeds on the existing tracks are presented. The interaction of rail-vehicle system is studied in order to derive values for smoother riding qualities. Thus, the two mathematical models were formed in the field of nonlinear theory in order to compile all the parameters of a vehicle. [Serbian]

Cucuz, N Rusov, L
International Federation for Theory of Mach & Mech Symp. Proc pp 7-20, 5 Ref.

ACKNOWLEDGMENT: EI (EI 74 603951)
PURCHASE FROM: ESL Repr PC, Microfilm

03 057437
ROLE OF THE CENTRE PLATE AND SIDE BEARING IN THE SAFE RIDING OF RAIL VEHICLES
Problems associated with the design of the support of the vehicle underframe on the truck by a center plate are discussed. The solution presented has the advantage of allowing the rocking of the vehicle body on its two trucks.

Kereszty, P *Acta Technica* Vol. 76 No. 1-2, 1974, pp 129-152, 9 Ref

ACKNOWLEDGMENT: EI (EI 74 604915)
PURCHASE FROM: ESL Repr PC, Microfilm

03 057487
REVOLUTION IN FREIGHT CARS-1974
Increasingly heavy demands are being placed on freight cars today. In addition, new car designs and record car orders are operating car building plants at capacity. These conditions have led to new research in vehicle and component design. The computer is a new useful tool to aid in the studies of car physical and dynamic action and in simulation models of freight car operation.

Progressive Railroading Vol. 17 No. 2, Feb. 1974, pp 33-36

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

03 057492
A BETTER RIDE FOR FORDS ON RAILCARS
Even though automobiles were securely tied to the car decks it was noted that some cars were damaged in transit by vibrations. In order to determine the cause and solution of this problem, the Ford Motor Company created a laboratory facility to reproduce the train operation. Then, in conjunction with Railroad Dynamics Inc., a new hydraulic damper was successfully developed.

Progressive Railroading Vol. 17 No. 4, Apr. 1974, pp 42-46

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

03 057495
CENTER PLATE EXTENSION GETS AT TRUCK HUNTING, YAW AND ROCK AND ROLL IN FREIGHT CARS
The Barber Center Plate Extension Pad was introduced several years ago and has proven to be very successful. The pads are mounted on either side of the center plate and function as extensions of the center plate. The pads reduce truck hunting and 'rock and roll' and can increase wheel life.

Progressive Railroading Vol. 17 No. 6, June 1974, pp 42-45

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

03 057519
EUROPE BENEFITS FROM US DRAFTGEAR EXPERIENCE
Conversion to autocouplers introduces forces which do not arise with manual coupling, since the latter demands very low impact speeds. In addition, the general trend in Europe towards heavier and longer freight trains with a higher proportion of bogie wagons considerably increases the longitudinal tractive and buffing forces generated. North American trains are much longer and heavier than the European norm, so US experience in draft-gear design could prove helpful in preparing for the changeover.

Anderson, DG (Miner (WH), Incorporated) *Railway Gazette International* Vol. 130 No. 6, June 1974, p 228, 2 Phot.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

03 057673
AMTRAK'S FRENCH-BUILT TURBINE TRAINS
Amtrak's French-built turbine trains operate between Chicago, Illinois and St. Louis, Missouri. The U.S. government-owned rail passenger corporation has options with ANF-Frangeco to purchase four to eight more of the trains, in addition to the two now being leased, during the 18 month trial period. Propulsion and auxiliary power aboard the trains is supplied by Turbomeca gas turbines.

Alberte, T *Diesel and Gas Turbine Progress* Mar. 1974, pp S19-S21, Figs.

ACKNOWLEDGMENT: Diesel and Gas Turbine Progress
PURCHASE FROM: ESL Repr. PC, Microfilm

03 057708
RAILCAR MANUFACTURING PLANT OPENED TO OVERCOME BCR SHORTAGE
The only railcar factory in Canada west of Ontario will begin production in mid-August. The factory was built by the British Columbia Railway to ensure that the railway will not experience again the car shortage of last year in which it lost an estimated $15 million in revenue. Although initially the entire output of the factory will be for the railway, the factory might enter the open market in competition against other manufacturers some time in the future.

Turner, R *Canadian Transportation & Distribution Management* Vol. 77 No. 5, May 1974, pp 28-30

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Southam Business Publications Limited 1450 Don Mills Road, Don Mills M3B 2x7, Ontario, Canada Repr. PC

03 057725
FEDERAL GERMANY'S RAPID-TRANSIT AND TRAMWAY DEVELOPMENT INCLUDING THYRISTOR-CONTROL TECHNIQUES
Duwag and Siemens joint development for Cologne is B-type lightweight articulated car for 100 km/h running with electric braking while Hanover will initiate its tram-subway operation next year with ten existing cars converted and 100 cars on order incorporating AEG, Kiepe and Siemens electrical equipment, the latter having been entrusted with the project work in co-operation with Ustra, the local transport undertaking.

Meier, GA *Rail Engineering International* Vol. 4 No. 5, June 1974, p 216

PURCHASE FROM: ESL Repr. PC, Microfilm

03 057727
FRENCH MONOMOTOR BOGIE FOR METRO LINES
A design incorporating a single traction motor located within a large roller-ring supporting the body provides good accessibility together with a straightforward "H" frame using rubber primary-and air-secondary suspension in the interests of minimizing maintenance.

Grevisse, L *Rail Engineering International* Vol. 4 No. 5, June 1974, p 226

PURCHASE FROM: ESL Repr. PC, Microfilm

03 057744
THE EUROPEAN COACH TAKES SHAPE
Railways of six western European nations have agreed to purchase 500 coaches built to a common design with ten pre-production prototypes scheduled to undergo testing by the administrations involved. Special attention is being given to running stability at speeds up to 200 km/h, to air-conditioning equipment, and to energy supply. Provision is made for production of the cars by manufacturers other than those initially involved in order that no group will be able to monopolize orders for future vehicles. The cars are financed by the European rolling-stock finance organization, Eurofima.

Modern Railways Vol. 31 No. 310, July 1974, 2 pp, 4 Phot.

PURCHASE FROM: XUM Repr. PC

03 057866
WHEEL LOAD AND STRESS ON THE CAR-AXLE DESIGN
The vertical and the lateral loads acting on car-axles of various cars were measured and the relations between these loads and car-weight or train speeds were investigated and useful data for car-axle design were obtained. The frequency distributions of the bending and the tortional stresses were studied and the characteristic values were obtained.

Tanaka, S Hatsuno, K Yaguchi, S *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 92-95, 2 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

03 071772
MULTIPLE-UNIT SETS BUILT BY ALSTHOM (GROUPE BRISSONNEAU) FOR YUGOSLAVIA (ZTP)
An illustrated description is provided of a luxury diesel-electric train built in France for Zagreb Transport Enterprises (ZTP), Yugoslavia. The train includes two motor coaches, two trailer cars and one buffet car. The total seating capacity is 204. The combined power of the two V12 supercharged diesel engines is 2100 hp. The power transmission system is electric, three-phase to dc, with six traction motors. Heating is supplied from the traction alternators; power for air conditioning and other purposes is derived from auxiliary alternators. The vehicle bodies and their equipment are described, both in the power and control compartments and in the passenger areas. The vehicle suspension, primarily rubber, with supplementary helical coil springs for lateral stability, is similar to a current French design; vertical and horizontal shock absorbers are provided, as also are limit stops to control motion on sharp curves. The noise level tests showed a 65 db A average. A dimensional diagram of the train and interior photographs of the cars and the driver's cab are shown.

Jaquemin, J *French Railway Techniques* Vol. 17 No. 1, 1974

ACKNOWLEDGMENT: EI (EI 74 800315)
PURCHASE FROM: ESL Repr PC, Microfilm

03 071774
NEW TWO-TIER SUBURBAN COACHES
New double-deck coaches developed for French suburban rail services are described. Four different coach types have been established: a 2nd Class coach (Be), a mixed 1st and 2nd Class coach (ABe), a 2nd Class coach with luggage compartment (BDe), a 2nd Class coach with reversing cab (Bxe). Each train is to have at one end a Bxe coach, at the other a BDe coach adjoining the motive power unit, the remainder (5,6 or 7 cars) being made up of Be and ABe coaches. The coaches are 24. 28 m long over buffers, and 2. 73 wide inside, except that the Bxe is 0.50m longer to provide more room for the driver. The total number of fixed seats per car is: 164 for Be, 144 for ABe, 156 for BDe, 132 for Bxe. Standing space is provided for: 132 in Be, 124 in ABe, 127 in BDe, 135 in Bxe. Heating and ventilating equipment is mounted in each car. Primary suspension is on V-shaped rubber springs; pneumatic secondary springs can be adjusted to maintain constant body height above track level irrespective of load. Coach Bxe includes a converter set to supply 380 v (neutral output) 50 Hz, 3-phase current for lighting, heating and air compression; a rectifier charges a 320 amp hr, 24v battery. The coaches can be operated on lines electrified at 1500v dc or 2500 v single-phase ac. Dimensioned drawings are shown for coaches Bxe and Be.

Tachet, P (French National Railways) *French Railway Techniques* Vol. 17 No. 1, 1974

ACKNOWLEDGMENT: EI (EI 74 800317)
PURCHASE FROM: ESL Repr PC, Microfilm

03 071775
SUBURBAN CAR TYPE ZRX 15300 OF ALUMINUM FOR THE FRENCH NATIONAL RAILROAD [Voiture banlieue SNCF type ZRX 1530 en aluminum]
The design of a newly developed prototype of a suburban car constructed of an aluminum alloy for the French National Railways is described in detail. [French]

Brisseaux, A *Revu de l'Aluminum* No. 426, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 800851)
PURCHASE FROM: ESL Repr PC, Microfilm

03 071789
FOUR-AXLE ALUMINUM TANK CAR FOR TRANSPORTING PHENOL (MODEL UADHS) [Vierachsiger Aluminum-Kesselwagen fuer den Transport von Phenol (Bauart Uadhs)]
The design and material features, operational characteristics, manufacture, and testing of a new model of a four-axle aluminum tank car constructed by Norwegian Company A/S Strommesis Vaerksted for the Norwegian Railroads are described. [German]

Groholt, K (Strommesis Vaerksted, Norway) *Schweizer Alumin Rundschau/Revue Suisse de Alumin* Vol. 24 No. 4, Apr. 1974, pp 118-126, 3 Ref

ACKNOWLEDGMENT: EI (EI 74 802800)
PURCHASE FROM: ESL Repr PC, Microfilm

03 071794
BOEING'S STATE-OF-THE-ART CAR: THE BIG TEST BEGINS IN NEW YORK
Two State-of-the-Art Cars (SOAC) operating on New York's Eighth Avenue subway line were produced as vehicles with an overall length of 74 ft. 8 in. and a truck center distance of 54 feet. The lightweight SOAC truck has a cast alloy-steel frame isolated from the axles by rubber-chevron primary springs which eliminate metal-to-metal contact between rail and carbody. The air-bellows secondary springing controls carbody leveling as well as further isolating rail-generated noise. Each truck is fitted with two 175-hp DC traction motors driving through double- reduction helical gears and elastomeric couplings.

Houser, F *Railway Age* Vol. 175 No. 11, June 1974

ACKNOWLEDGMENT: EI (EI 74 803407)
PURCHASE FROM: ESL Repr PC, Microfilm

03 071824
FREIGHT AND PASSENGER CARS OF THE GERMAN FEDERAL RAILROADS [Die Gueter-und Reisezugwagen der Deutschen Bundesbahn]
A review is given of the design of the recent models of freight and passenger cars for the German Federal Railroads, with particular emphasis on the use of sheet and strip metal in the car manufacture. [German]

Bott, H (Bundesbahn-Zentralamt, West Germany) *DFBO Mitteilungen* Vol. 25 No. 3, Mar. 1974

ACKNOWLEDGMENT: EI (EI 74 706544)
PURCHASE FROM: ESL Repr PC, Microfilm

03 071828
WROUGHT-STEEL PASSENGER-CAR WHEELS FROM A CONSUMER'S STANDPOINT
This paper outlines briefly basic considerations in the selection of proper class of wheels for passenger-car services to insure safe operation and discussion of matters pertaining to their economic maintenance. The paper also discusses briefly types of past and present service defects in passenger-car wheels, and thermal effects which result from undue braking in certain classes of train operation. In the interest of good wheel maintenance references are made to established wheel practices of the Association of American Railroads (AAR) and the economy of proper inspection and turning of the wheels.

Contributed by the Railroad Division for presentation at a joint session of the Railroad Division & American Society for Testing Materials at the Annual Meeting, New York, N.Y., Nov. 29-Dec. 4, 1953, of the American Society of Mechanical Engineers.

Johnsen, AM (Pullman Company)
American Society of Mechanical Engineers Paper 53-A-113, 1973, PP 73-78

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

03 071840
NOISE IN RAIL TRANSIT CARS: INCREMENTAL COSTS OF QUIETER CARS
U.S. rail rapid transit systems, car operations, and the car building industry are described in relation to the procurement of quieter cars. The noise environment of passengers in rapid transit cars is discussed and the major noise sources and paths of noise transmission into cars are delineated. For essentially all combinations of car noise-control modifications deemed technically and economically feasible for implementation in new vehicles, estimates are presented of the associated noise reductions, initial costs, and operating costs. It is concluded that significant reductions in in-car noise under typical operating conditions can be achieved at incremental costs that are small percentages of the total car costs.

Ungar, EE
Bolt, Beranek and Newman, Incorporated, Environmental Protection Agency Final Rpt. June 1974, 45p

Contract EPA-68-01-1539

ACKNOWLEDGMENT: NTIS (PB-234992/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-237992/6, DOTL NTIS

03 071843
ATA RAIL TRANSIT CONFERENCE HELD IN SAN FRANCISCO, CALIFORNIA ON APRIL 14 AND 16, 1974. CAR EQUIPMENT SESSIONS. PAPERS
Two of the papers concern the BART maintenance philosophy and their scheduled and unscheduled maintenance, rail vehicle inspection, diagnostic procedures and vehicle warranties as well as personnel training and tools and materials. The paper by Jeffrey Mora discusses the AC motor versus D.C. motor demonstration project conducted on three Cleveland Transit System rail cars. Mr. Lawson discusses a current study of the use of a kinetic energy flywheel as an efficient energy storage system and his intention to demonstrate this system in San Francisco Muni electric trolley coaches. The paper by J. R. Vollmar discusses the merits, costs and problems of electric locomotive versus multiple unit electric trains in both commuter and inter-city service.

Prepared by Lockheed Missiles and Space Co., Inc., Bay Area Rapid Transit District, Urban Mass Transportation Administration, and Louis T. Klauder and Associates.

Lawson, LJ Presho, WJ Venturato, A Mora, JG Vollmar, JR
American Transit Association ATA/RT-74/1, Aug. 1974, 74p

ACKNOWLEDGMENT: NTIS (PB-234824/1)
PURCHASE FROM: NTIS Repr. PC, MICROFICHE
PB0234824/1, DOTL NTIS

03 071973
AMERICAN FREIGHT CAR TRUCKS
A brief survey is presented of the fundamental performance requirements of trucks for railroad cars, and an outline is given of research in progress in this area by the AAR (Association of American Railroads) in cooperation with other interested organizations. The functions of a truck can be summed up as follows: guidance of the car along the rail, isolation and protection of car and contents, support of car and contents...and, transmission of brake retarding forces. One of the major problems being studied is divergent hunting in which the wheelset over-corrects for a displacement so that the amplitude of each cycle of oscillation is greater than the previous one. Hunting is a complex phenomenon. There appear to be at least 12 factors which influence the speed at which violent hunting will occur.

Dwyer, HI
Railroad Engineering Conference Tech Proc

ACKNOWLEDGMENT: EI (EIX740904034)
PURCHASE FROM: ESL Repr PC, Microfilm

03 072455
SPECIAL FEATURES OF THE DESIGN, ASSEMBLY AND WELDING TECHNOLOGY FOR ALUMINUM ALLOY RAILWAY CARRIAGE BODIES
The design of the body of the RT-200 carriage for the passenger train Russkaya Troika, designed to run at up to 200 kph, is described. The assembly and welding technology for this aluminum alloy structure is given. Tests have confirmed the service realiability of the body.

Originally published in Russian by Arc Welding Institute, Kiev and the Ukraine S.S.R. Academy of Sciences, 1974.

Makarov, VP (All-Union Scientific Res Inst for Roll Stock Manuf); Ignat'ev, VG (Academy of Sciences, Ukraine); Makarov, AM (Kalinin Rolling Stock Works) *Automatic Welding* Vol. 27 No. 1, 1974, pp 44-46, 3 Fig., 2 Tab., 1 Ref.

ACKNOWLEDGMENT: Automatic Welding
PURCHASE FROM: Welding Institute Abington Hall, Abington, Cambridge, England Repr. PC

03 072484
HIGH SPEED FREIGHT WAGONS
In 1969 the Railway Engineering Group of the Institution of Mechanical Engineers conducted a conference during which five technical papers were presented. The opening address identified the five basic commercial requirements for freight rolling stock as: High payload/tare ratio; construction and maintenance costs; adaptibility; safety; and running speed. The paper presented included: Current Design Activities on British Railways; Wagons and the Private Owner; Suspension Design for High-Performance Two-Axle Freight Vehicles; The Private Builder's contribution to the Development of Freight Stock; and Wagon Running Gear.

This is the proceedings of a conference arranged by the Railway Engineering Group of the Institution of Mechanical Engineers, 16 October 1969.

Institution of Mechanical Engineers Proceeding Vol. 184 No. 3D, 1969, 90 pp

ACKNOWLEDGMENT: Institution of Mechanical Engineers
PURCHASE FROM: Institution of Mechanical Engineers 1 Birdcage Walk, Westminster, London SW1H 9JJ, England Repr. PC

03 072486
WAGONS AND THE PRIVATE OWNER
This paper relates the experience of a large private owner during a program of fleet modernization over a five year period. The benefits obtained, together with the technical and other difficulties encountered, are described. The obstacles that history always provides to innovations are discussed and solutions are outlined. Operating experience with 45-and 100-ton cars is related, and progress in unit train operation is reported. From the private owners' viewpoint, some stringent observations are made upon the attitude of British Rail, but suggestions are made which would largely remedy the situation. Design features are given and experience with individual details are discussed. This is one of five papers presented at a conference on High-Speed Freight Wagons.

This paper was presented at a conference arranged by the Railway Engineering Group of the Institution of Mechanical Engineers, 16 October 1969.

Farquharson, FK (Shell-mex and British Petroleum Limited)
Institution of Mechanical Engineers Proceeding Vol. 184 No. 3D, 1969, pp 15-21

ACKNOWLEDGMENT: Institution of Mechanical Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072487
SUSPENSION DESIGN FOR HIGH PERFORMANCE TWO-AXLE FREIGHT VEHICLES
The paper outlines the principal suspension performance criteria which needs to be satisfied when two-axle vehicles are operated at high speed. The derivation of a set of suspension parameters to meet these criteria is discussed. Suspension designs which realize these parameters are described. A test vehicle fitted with this design of suspension has been built and the results of track tests are given. Detailed dynamic studies and the mechanical design have been confirmed by the improved behavior of this vehicle. Its first cost is higher than designs such as the UIC double-link suspension, but maintenance requirements are minimized. This is one of five papers presented at a conference on High-Speed Freight Wagons.

This paper was presented at a conference arranged by the Railway Engineering Group of the Institution of Mechanical Engineers, 16 October 1969.

Wickens, AH Gilchrist, AO Hobbs, AEW (British Railways Board Research Department)
Institution of Mechanical Engineers Proceeding Vol. 184 No. t3D, 1969, pp 22-36

ACKNOWLEDGMENT: Institution of Mechanical Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072488
THE PRIVATE BUILDER'S CONTRIBUTION TO THE DEVELOPMENT OF FREIGHT STOCK
Recently private builders have designed and built large fleets of wagons for private owners to operate on British Railways in transporting their products rapidly in bulk. This paper describes a number of these vehicles, discusses aspects of design and standardization, and reviews many of the problems that have arisen, particularly in regard to suspension systems. The modernization of fleets commenced with four-wheeled wagons and progressed to 100-ton bogie vehicles. Some future trends are forecast in relation to the contribution the private builder can make in manufacture and design of modern freight stock. This is one of five papers presented at a conference on High-Speed Freight Wagons.

This paper was presented at a conference arranged by the Railway Engineering Group of the Institution of Mechanical Engineers, 16 October 1969.

Finch, WF Botham, GJM (Metro-Cammell Limited)
Institution of Mechanical Engineers Proceeding Vol. 184 No. t3D, 1969, pp 37-44

ACKNOWLEDGMENT: Institution of Mechanical Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072555
THE ET403, A NEW DB HIGH-SPEED ELECTRIC MULTIPLE-UNIT CONSIST FOR 200 KM/H
Development towards a 200-km/h upward Inter-City electrified network incorporating some additional 650-route-km has led to the designing of a prototype 200-km/h train based on four-car fully-motored sets to run in multiple for lengthening by individual cars as traffic requires while retaining the full designed-performance due to the traction automony of all vehicles. Thyristor-chopper techniques applied and pantograph on end-cars only, adopted and linked by h.t. conductor along the vehicle roofs. Fully-integrated rheostatic and air braking giving 1,650-m service-stop distance from 200 km/h while emergency magnetic rail-braking also fitted.

Bauermeister, K *Rail Engineering International* Vol. 4 No. 7, Sept. 1974, pp 314-318, 7 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

03 072586
ECONOMICS OF FREIGHT CARS WITH CHARACTERISTICS APPROACHING THE LIMITS OF ACCEPTABLE DESIGNS
This report is intended to investigate the economic impact of operating specialized freight cars of unusual design having relatively high gross weights, relatively high axle loadings, multiple trucks, articulated couplings, excess width and/or unusual length. There can be effects on switching operations, train operations, maintenance of way and structures facility requirements and competition in transportation markets. This report does not offer quantitative solutions to the problems inherent in the operation of cars with characteristics approaching design limits, but rather outlines what those limitations are and suggests some of the conditions that can develop.

AREA Bulletin Proceeding Vol. 76 Bulletin 649, Sept. 1974, pp 137-142

ACKNOWLEDGMENT: AREA Bulletin
PURCHASE FROM: AREA Repr. PC

03 072668
MINIMAX OPTIMIZATION OF RAILWAY VEHICLE SUSPENSIONS
The minimax response of a complex dynamic system, such as a railroad vehicle, can be obtained by choosing certain (optimum) values of the stiffness and damping elements in the system. The railway vehicle is mathematically modeled as a linear, stable, strictly dissipative multi-degree of freedom dynamic system. The system is excited at more than one point by synchronous harmonic forces. A minimax principle reduces the problem to that of finite dimensional optimal design problem. Non-linear mathematical programming techniques are used to minimize the non-linear objective function representing the maximum resonant response at a point of the system, and subjected to linear or non-linear constraints, over a certain frequency range. The frequency range may be finite or infinite. Dynamic response of the system before and after optimization is shown, and three-dimensional plots for the constrained and unconstrained objective function versus the two most important design parameters are illustrated.

This paper was contributed by the Rail Transportation Division of the ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Elmaraghy, WH Dokainish, MA Siddall, JN (McMaster University, Canada)
American Society of Mechanical Engineers No. 74-WA/RT-3, June 1974, 12 pp, 9 Fig., 6 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

03 072669
DAMPING REQUIREMENTS TO CONTROL VERTICAL AND ROLL MOTION OF FREIGHT CARS
Compression dampers located in the freight car spring group can effectively control the car body in the roll and vertical motion modes resulting from the more common track surface variations. Computer drawn traces show the motion and forces between car body, truck components and track resulting from a multi-degree of freedom, three-dimensional, mathematical model of a 100 ton freight car traversing track with defined surface variations. Comparisons of response resulting from hydraulically controlled springs and a conventional spring group suspension controlled only with coulomb friction shows generally that conventional suspension with only friction damping, results in a severe resonance for both vertical and roll modes with extreme weight shift and high reactions between freight car components and track-a resonance limited only by the system non-linearities. Single acting hydraulic damping can be defined with sufficient energy absorption that can limit forces and motion at each given resonance, reducing weight shift and derailment jeopardy, as well as, equipment and track damage.

This paper was presented at the Rail Transportation Division Session RT-3 of the ASME Annual Meeting 20 November 1974.

Wiebe, D
Stucki (A) Company 1974, 13 Fig., 6 Ref.

ACKNOWLEDGMENT: Stucki (A) Company
PURCHASE FROM: Stucki (A) Company Mckees Rocks, Pennsylvania, Repr. PC

03 072671
PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1973-1974 REPORT OF SURVEY COMMITTEE) LOCOMOTIVES
This report covers motive power designs that have been delivered and developments undertaken in the survey period of September 1, 1973 to September 1, 1974. Data and photographs for seven new diesel locomotives and two electric locomotives are presented. Electrification plans on a world-wide basis are also discussed.

This paper was contributed by the Rail Transportation Division of ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Baker, PH Schulze, FW (General Electric Company)
American Society of Mechanical Engineers No. 74-WA/RT-6, July 1974, 12 pp, 13 Fig., 3 Tab., 14 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

03 072672
PROGRESS IN RAILWAY MECHANICAL ENGINEERING (1973-1974 REPORT OF SURVEY COMMITTEE) CARS AND EQUIPMENT
This survey covers some of the major developments in freight and people transportation equipment made public in the last calendar year. Because of the oil embargo, the increasing demand for power, and more stringent pollution laws, the demand for low sulfur coal out of the west is in great demand. Hence, there is a large need for cars to haul coal. Because of large loss and damage claims in the automotive industry, new equipment for transporting automobiles that is vandalism-and damage-free was developed. In the people transport area, new developments, mostly funded by the Department of Transportation (D.O.T.), are continuing to materialize.

This paper was contributed by the Rail Transportation Division of ASME for presentation at the Winter Annual Meeting. 17-22 November 1974, New York, New York.

Manos, WP (Pullman-Standard)
American Society of Mechanical Engineers No. 74-WA/RT-10, June 1974, 9 pp, 30 Fig.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

03 072692
DEFINITION OF SPIRAL SPRINGS. APPLICATION IN RAILWAY ROLLING STOCK SUSPENSION [Une determination des ressorts en helice. Application a la suspension de materiels ferroviaires]
A calculation method is described in the first part, followed by its validity and limits on the basis of experimental research. The second part gives the characteristics of the materials, the methods of improving (protection against corrosion). The third part deals with the definition of suspension springs for Y 32 trucks and the rules to be followed for their manufacture, verification and use. [French]

Revillon, A (French National Railways) *Revue Generale des Chemins de Fer* Vol. 93 July 1974, pp 442-455

ACKNOWLEDGMENT: EI (EI 74 065237)
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072700
AUTOMATIC COUPLING OF RAILROAD CARS [L'introduction de l'attelage automatique]
The advantages of automatic coupling of railroad cars in marshalling yards are discussed. The current problems in introduction of automatic electronic coupling are presented and recommendations given. [French]

Winter, P *Bulletin Technique De La Suisse Romande* Vol. 100 No. 16, Aug. 1974, pp 330-333

ACKNOWLEDGMENT: EI (EI 74 065242)
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072760
THE HIGH SPEED TRAIN
Described are the design and prototype testing of the High Speed Train. British Rail's strategy was quick development and introduction of this passenger train concept to retain and possibly increase traffic prior to introduction of the Advanced Passenger Train. Modifications made as a result of prototype tests are being incorporated in the first 27 production trains due for introduction in September 1975. The author notes that building the prototype train has been of inestimable value with the troubles encountered hopefully designed out of the production versions.

Sephton, BG *Railway Engineering Journal* Vol. 3 No. 5, May 1974, pp 22-30, 12 Fig., 1 Ref.

ACKNOWLEDGMENT: Railway Engineering Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072761
TANK WAGONS FOR THE CONVEYANCE OF DANGEROUS GOODS ON BR LINES
Summarized are some of the important factors which warrant special attention in the design of tank cars for dangerous commodities. Quality of manufacture, coupled with rigorous inspection and testing procedures are cited. Ride and braking performance are essential elements in safe operation; the need for high maintenance standards during the car's service life must be recognized. British Rail and private owners strive to assure the containment of dangerous commodities in derailments, but the involvement of public agencies must also be encouraged.

Smith, AD *Railway Engineering Journal* Vol. 3 No. 5, Sept. 1974, pp 6-12, 8 Fig., 3 Ref., 1 App.

ACKNOWLEDGMENT: Railway Engineering Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072762
LIGHT-WEIGHT TWIN-CAR ARTICULATED-SETS FOR TYNE AND WEAR 1,500-V METRO
Compact 270-passenger capacity aluminum-clad sets designed for multiple-operation up to three units mounted on Duwag bogies with leading and trailing motored and intermediate incorporating a three-ring ball-race articulation with wide vestuble-connection between bodies. Metro-Cammell designed in conjunction with GEC and Siemens for speeds up to 80 km/h with Westinghouse Westcode control and Scharfenberg automatic couplers incorporating all connections to ensure manual-free making-up of multiple formations. Dynamic braking and spring-operated disc brakes with magnetic track brakes for emergency application.

Rail Engineering International Vol. 4 No. 8, Oct. 1974, pp 371-374, 2 Fig., 2 Phot.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072763
MODERN METRE-GAUGE 1,200-V TWIN SETS WITH ELECTRONIC CONTROL FOR SWISS SECONDARY LINES
United Bern-Worb Railways purchased 12 electric twin-car sets for multiple operation on 30-min interval schedules selecting fixed consists to ensure constant power ratios for augmented formations under peak-hour working. SIG and Brown Boveri contributed to providing light-weight traction units embodying very modern techniques.

Rail Engineering International Vol. 4 No. 8, Oct. 1974, 8 pp, 3 Fig., 7 Phot.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072764
RUNNING GEAR DESIGN INCORPORATING RUBBER SPRINGS
The use of rubber springs and components at primary-and secondary-suspension stages has spread very rapidly, notably with city rolling stock such as underground railways and tramways, and also with industrial, shunting and main line locomotives. Body-supporting airsprings are used in conjunction with primary rubber-suspensions with underground, city and suburban coaches and to a lesser extent, with main line coaches. The reasons are to a great extent because of the exceptionally low, if any, demands as far as maintenance is concerned, combined with reduced noise levels, the absorption of high-frequency oscillations and the ability to implement the desired characteristics in all three planes.

Reed, AJ (Dunlop Limited); Koffman, JL *Rail Engineering International* Vol. 4 No. 8, Oct. 1974, pp 361-368, Figs.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

03 072852
SLEEPING CARS TO MEET TODAY'S NEEDS
As Cie des Wagons-Lits undergoes a transformation from an owner and operator of sleeping cars to a service organisation, new vehicles based on its long experience are under construction for national railways and the European sleeping car pool. Along with recent growth of second class

sleeping car travel has come a demand for higher standards of comfort, and three current orders show that these needs are being met.

Railway Gazette International Vol. 130 No. 10, Oct. 1974, pp 400-403, 1 Phot.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

03 072853
HEATHROW EXTENSION BRINGS LONGER TUBE CARS TO THE PICCADILLY LINE
Delivery of the first cars of London Transport's 1973 tube stock heralds a large-scale reshuffle of cars between lines when the Heathrow extension is completed in 1976 and the Fleet line opens in 1977.

Railway Gazette International Vol. 130 No. 10, Oct. 1974, pp 398-399, 1 Fig.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

03 072965
SONICAR
Sonicar is a self-contained, automatic system for controlling the coupling speed of free rolling freight cars during switching operations. By assuring that coupling impacts take place below 4 mph, a dramatic reduction is expected in lading damage. The system is inactive during normal train operation and does not affect normal braking action. System concepts, operation, and field results are discussed.

The paper was presented to the ASME, New York, December 1968.

Trevisin, RF
American Society of Mechanical Engineers No. 68-WA/RR-8, Dec. 1968, 8 pp

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

03 080082
THE "COLOGNE" URBAN SERVICE CAR—A MODERN UNDERGROUND RAILWAY VEHICLE [Der Stadtbahnwagen Typ Koln—ein modernes U-Bahn Fahrzeug]
The "Cologne" urban service car was developed by DUWAG for new underground and urban railways, and can also be used on ordinary tramway systems. The article reports on the planning concept and design of this vehicle. [German]

Brand, W *Eisenbahntechnische Rundschau* Vol. 23 No. 9, Sept. 1974, pp 339-346, 8 Fig., 2 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

03 080091
FIRE EXPERIMENTS OF COACH
As part of the equipment development program of the Japanese National Railways, steps are being taken to step up the fire prevention and protection qualities of passenger cars. Because of the high speeds, long tunnels and subways in which trains operate, and the large amount of new rolling stock which is planned, preventing train fires is given high priority. The resistance of various seat upholstery materials to ignition from a burning newspaper were checked initially. Subsequently the same second class coach was ignited and the fire allowed to burn fiercely with smoke concentrations, gasses and temperatures monitored as the conflagration continued inside the standing car. Further work on fire suppression is planned.

Oikawa, I *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 131-132, 3 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

03 080098
WAGONS FOR CARRYING LARGE CONTAINERS IN LINER-TRAINS
This summary of the design process for standardized container cars for UIC demonstrates the continuing work of ORE B112 Committee. Two types of cars meet the requirements of the Technical Unity of Railways (UT) of the International Union of Railways. They are suitable for running in SS service (120 kph) with a 20-ton axle-load. One car is a two-trucked unit 19,640 cm long over buffers; the other is a three-truck articulated design which is 27,100 cm long. The ORE Control Committee has approved both designs and it is anticipated there will be large orders for both types placed in coming years.

Rail International No. 9, Sept. 1974, pp 615-617, 2 Fig.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: UIC Repr. PC

03 080118
THE FRACTURE PROPERTIES OF TWO FAILED CAST STEEL WHEELS FROM THE UNION PACIFIC RAILROAD
During the late autumn of 1972 the Union Pacific Railroad had what appeared to be an unusually high number of wheel failures associated with low ambient temperatures. This behavior suggested to the Union Pacific that the temperature may have dropped below the materials transition temperature. In this connection the AAR was requested to determine the fracture properties of two cast steel wheels which failed during low temperature conditions (less than 35 F). On the basis of both the Charpy and critical stress intensity factor tests both wheels did not significantly change their fracture characteristics over the entire range of operating temperatures.

Stone, DH
Association of American Railroads Research Center, (R027) R-123, May 1973, 10 pp, 3 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080119
CURRENT POPULATION OF COUPLERS AND KNUCKLES IN FREIGHT SERVICE INCLUDING IDENTIFICATION OF RECLAIMED COUPLERS
This report contains the results of a two week coupler and knuckle population study conducted in three large Chicago classification yards operated by three different railroads. The sample included 864 freight and tank cars in regular interchange service in the Chicago area. A comparison of the types of cars included in the Chicago sample with the U.S. fleet indicates, for example, that the sample included significantly more than an average number of box cars and less than an average number of hopper cars. It is possible that the various types of cars have a different average age and see different kinds of service. This could affect the coupler and knuckle population. Therefore, samples at several other major geographic areas with a different mix of cars would seem desirable to establish the population with more reliability.

An RPI-AAR Cooperative Project.

Morella, NA Cook, R
Association of American Railroads Research Center Tech. Rpt. R-116, July 1972, 43 pp, 15 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080122
COUPLER STEEL STUDY
FRA regulations stipulate that only approved couplers may be used on tank cars. Since some considerations was given a requirement for the use of Grade "E" steel in Type "F" couplers, the AAR Research and Test Department undertook a preliminary study of the properties of "C" and "E" steels in "F" couplers selected at random from stocks about to be utilized by railroads. The increase of strength between "C" steel and "E" steel does not contribute to an increase in a tendency toward brittle failure. In fact, the increase in strength is accompanied by a reduction in the transition temperature. Brittle service failures can be expected, especially in winter operating circumstances with heavy loads. The macroscopic examination reveals that the quality of the castings is lower than should be expected of material subjected to high service loading.

Contributing agencies are the Battelle Memorial Institute and the Southern Railway System.

Wisnowski, MJ
Association of American Railroads Research Center, (70-R-61) Proj. Rpt. R-107, Dec. 1970, 49 pp, 23 Fig., 10 Tab., 20 Phot., 2 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080123
PROGRESS REPORT—DEVELOPMENT OF AN ASSOCIATION OF AMERICAN RAILROADS DYNAMIC BOLSTER TEST
Preliminary work was completed on the analysis of the strength of truck bolsters relative to possible service type loadings. Measurements were made of maximum tensile and compressive stresses occurring in a bolster specimen under laboratory conditions simulating predicted service imposed loadings occurring with cyclic frequency. The results of the full study are expected to lead to a laboratory fatigue test for use in an acceptance specification for bolsters. The stress measurements were made for two general types of loading conditions considered to be the principal types of cyclic fatigue loadings imposed on truck bolsters in service. For both type loadings, stress measurements were made at a number of load levels. The basic procedures used in this study are presented in this report. There were some deviations required from these procedures that are explained in the report.

Association of American Railroads Research Center R-106, Oct. 1970, 7 pp, 11 Fig., 2 Tab., 2 Phot., 2 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080127
LABORATORY STATIC TESTS ON BODY BOLSTER CENTER PLATES
Service experience has shown that the AAR standard separable body centerplates (both cast and forged) fabricated with a 3/4-inch thick flange and a 3/8-inch radius, between the bowl and flange, develop fatigue cracks around the bowl the 3/8-inch radius. The purpose of this test was to determine the stress reduction achieved by substitution of a 3/4-inch thick flange. Results showed the larger 3/4-inch radius reduced the stress in the area of failure. The lack of consistency in flange flatness influenced all results and masked the effect of the thicker 1-inch flange.

Ryan, JP
Association of American Railroads Research Center, (R-002) Test Rept. R-116-A, Aug. 1972, 44 pp, 21 Fig., 16 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080128
STATISTICAL SUMMARY OF JOINT AAR-RAILROAD SURVEY OF CRACKED OR BROKEN COUPLERS, KNUCKLES AND YOKES IN FREIGHT SERVICE ON FIVE RAILROADS
To determine the approximate number of cracked or broken couplers, knuckles and yokes being regularly removed from freight service and to note the general relation of design, service life, location of failure and ambient temperature, the AAR and five railroads initiated a joint program. The investigation took the form of a field survey. This is a summary report and includes all the statistical data that has been computer sorted into tabular form for both the summer and winter periods of the program.
An RPI-AAR Cooperative Project.

Morella, NA Cook, R
Association of American Railroads Research Center, (C-65-7) R-118, Sept. 1972, 176 pp, Figs., 114 Tab., 6 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080129
SUMMARY OF VISUAL INSPECTION RESULTS CRACKED OR BROKEN FREIGHT CAR COUPLERS, KNUCKLES AND YOKES
This report contains the results from a visual inspection of 1097 broken freight car couplers, knuckle and yoke components collected by five railroads during a thirty day period. The sample was collected as part of a joint AAR-Railroad program, just prior to the start of this joint RPI-AAR Railroad Coupler Safety Research and Test Project, to initially determine the approximate extent and character of current failures in couplers, knuckles and yokes. The result of this inspection, when combined with current population data, do not permit the determination of failure rate for the various components because the proportion of the total industry failures represented by the sample is indeterminate and the sample is, for most components, too small to provide the desired reliability. The results from this inspection will, however, supply valuable insight required to determine the necessary procedures, data and sample size to achieve the project objective.

Morella, NA Cook, R
Association of American Railroads Research Center, (C-65-7) R-117, Aug. 1972, 122 pp, 3 Fig., 104 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080243
ULTRASONIC MEASUREMENT OF STRESS IN RAILROAD WHEELS AND IN LONG LENGTHS OF WELDED RAIL
The failure of high speed emergency braking is discussed for railroad wheels and track. It is shown that high compressive residual stresses exist in the rims of new wheels which generate excessive heat, reducing the stress levels. Thermal stresses that build up in continuous lengths of welded track are reported and nondestructive methods of measuring stresses in thick steel are presented for identification, replacement, or adjustment before hazardous failures occur.

Clotfelter, WN Risch, ER
Marshall Space Flight Center NASA-TM-X-64863, July 1974, 36 pp

ACKNOWLEDGMENT: NTIS (N74-31359/4ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
N74-31359/4ST, DOTL NTIS

03 080249
SOAC (STATE-OF-THE-ART CAR) DEVELOPMENT PROGRAM. VOLUME I. DESIGN, FABRICATION AND TEST
Design, fabrication and test of two new State-of-the-Art Cars (SOAC) whose objective is to demonstrate the current state-of-the-art in rail rapid transit vehicle technology were carried out. Passenger convenience and operating efficiency were primary goals. The SOAC features a DC-DC chopper in the propulsion system, separately excited DC traction motors, all-steel construction (with molded fiberglass ends), and vandal-resistant and fire-retardant materials in the interior. This volume, Volume 1 of a two-volume report, covers the development program through engineering testing; including data on design and performance, propulsion and braking, subsystems, test program, mockup and demonstration programs, and economic analysis.

Boeing Company, Urban Mass Transportation Administration Final Rpt. D174-10031-1, Apr. 1974, 193 pp

Contract DOT-UT-10007

ACKNOWLEDGMENT: NTIS (PB-235703/6ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235703/6ST, DOTL NTIS

03 080281
CURRENT POPULATIONS OF COUPLERS AND KNUCKLES IN FREIGHT SERVICE INCLUDING IDENTIFICATION OF RECLAIMED COUPLERS
A field population study was made by looking at couplers and knuckles on one end of 5053 active freight cars in the U.S. fleet at eleven classification yards operated by nine major railroads at five different cities; namely, Chicago, Illinois, Washington, D.C., Atlanta, Ga., Houston, Texas, and Los Angeles, Calif. The specific coupler data included coupler catalog number date of original manufacture, name of manufacturer and date

most recently reclaimed. The specific knuckle data included knuckle catalog number in all cases but date of original manufacture and name of manufacturer only if the car was not coupled. Car data included age of car (new or rebuilt), type of car, capacity of car and car number.

An RPI-AAR Cooperative Project.

Morella, NA Cook, R
Association of American Railroads Research Center Res. Rpt. R-119, Feb. 1973, 85 pp, 1 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080287
YOKE SERVICE PERFORMANCE
Presents the initial 18 months of yoke removal data (for foreign cars only) reported to the newly established AAR Mechanized Car Repair Billing Exchange System in Washington, D.C. This computerized system lists the reason the yoke was removed under eight code numbers which interpreted mean: worn out, broken, missing, bent, bent beyond repair, obsolete, account other repairs, and removed in good condition. There were a total of 19,647 yoke removals reported in the initial 18 months. The number of reporting railroads (11 total) participating in the system at the end of the first 18 months accounted for a little over half of the freight car ownership in 1972 and therefore perhaps about half of the yokes removed from foreign cars by railroads (foreign cars are cars not owned by the reporting railroad). Considering this condition combined with other factors it seems reasonable to multiply the total removals reported to the AAR Billing Exchange by about 6 to obtain the total removals by the industry for the entire current service fleet of freight cars.

An RPI-AAR Cooperative Project.

Morella, NA Cook, R
Association of American Railroads Research Center Res. Rpt. R-150, July 1973, 24 pp, 4 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080288
COUPLER AND KNUCKLE SERVICE PERFORMANCE
Combines failure data from two sources with fleet population data to obtain a relative failure index which is a measure of the relative failure rates among the coupler and knuckles components currently in freight service on American railroads. Also, includes statistics from the AAR mechanized car repair billing exchange system for couplers and knuckles removed from service during an eighteen month period. A relative wear index has been calculated. Includes recommendations for removal from service of highest failure rate coupler and knuckle components.

Morella, NA Cook, R
Association of American Railroads Research Center Res. Rpt. R-149, June 1973, 67 pp, 3 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080289
FINAL PHASE 09 REPORT ON TANKS, FITTINGS, AND ATTACHMENTS IN THE MECHANICAL ENVIRONMENT OF ACCIDENTS
Phase 09 of the RPI-AAR Tank Car Safety Research and Test Project concerns the behavior of tank car tanks and their appurtenances in the mechanical environment of railroad accidents. Thus, the items treated under this Phase 09 are: Tank shell-the portion of the tank between the heads, Tank fittings-the appurtenances attached to the tank shell and heads which are associated with openings through the vessel wall, and tank attachments-appurtenances attached to the tank shell and heads which are not associated with openings through the vessel wall. As an underlying principle, in the cost/benefit analyses under this study, the benefit values of design improvements, such as protective devices or "shields," are developed from accident data only from cases involving lading loss, the total dollar losses being the value of the lost lading plus that of subsequent losses caused by the lading loss. The cost of mechanical damage itself to shells or appurtenances is not considered reducible by a design change, it being assumed that the cost of repairing the "shield" is the same as that of repairing the unshielded item. Following the statement of the objective, the report comprises four main sections: (1) review of typical current tank car shell and appurtenance designs, (2) review and analysis of accident data, (3) discussion and conclusions, and (4) recommendations.

An RPI-AAR Cooperative Program.

Reedy, CE Phillips, EA
Association of American Railroads Research Center, (RA-09-1-24) R-147, 88 pp, Figs., 3 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080291
EFFECTS OF FIRE ON LPG TANK CARS. PHASE II REPORT
The response of a DOT 112A340W tank car to a fire environment is investigated theoretically in this study, giving particular attention to propane lading. The possibility of tank rupture arising from variations in filling density, tank thickness, safety-relief valve setting and discharge rate is analyzed for fire conditions ranging from a unit heat input of 34,500 BTU/HR-FT over the entire tank surface to approximately one quarter of this value. The analysis and, hence, conclusions are based on several assumptions necessitated by the lack of data in certain areas; thermodynamic properties of commercial propane; valve discharge efficiencies with saturated fluids and slightly subcooled liquid; stratification effects; and of course, the statistical spectrum of the fire environment. Nevertheless, the results are published at this time as a foundation upon which further project work will be based.

An RPI-AAR Cooperative Project.

Manda, L
Association of American Railroads Research Center, (RA-11-1-5) R-128, Apr. 1971, 68 pp, 19 Fig., 5 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

DOTL RP

03 080297
REPORT ON DETERMINATION OF MOMENT CHARACTERISTICS IN A HORIZONTAL PLANE OF MATED COMBINATIONS OF TYPE "E" AND "F" COUPLERS. PHASE 10 REPORT
The objectives of this laboratory test were to determine the moment-angle relationship in a horizontal plane for each of three coupler combinations (E-E, F-F, and E-F) installed complete with draft gear, yoke, etc., in tank car stub sills and to study the elastic-plastic behavior of failure of the various components in the assemblies. The lateral moment resistance in all three coupler combinations is of the same magnitude. The moment-angle curves exhibit an identifiable elastic and plastic range. In the higher load region, the two "E" couplers exhibited greater ductile behavior—probably due to the elongation of the knuckles. In the case of the two "F" couplers, an earlier fracture occurred with less yielding of components. In the "E" combination, the higher load portion of the curve exhibited yielding somewhat between that of the other combinations. Failure in each test occurred in the coupler shank between the horn and that portion which contacted the striker side.

An RPI-AAR Cooperative Project.

Sims, RD
Association of American Railroads Research Center, (RA-10-1-11) R-134, Feb. 1972, 19 pp, 3 Fig., 11 Phot.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080305
ALL THAT GLITTERS IS NOT STAINLESS STEEL
As a participant in the surveys that preceded the acquisition of railroad-owned passenger cars by Amtrak, the author has come to a series of conclusions about the design and features of equipment presently in ser-

vice. Also offered are suggestions about the construction of future passenger cars.

Weinman, MR *Trains* Vol. 35 No. 3, Jan. 1975, p 22, Phots.

PURCHASE FROM: Kalmbach Publishing Company 1027 North 7th Street, Milwaukee, Wisconsin, 53233 Repr. PC

03 080312
ADVANCED TECHNOLOGY IN THE DB'S NEW SERIES 628 LIGHTWEIGHT RAILCARS-PART I [Fortschrittliche Technik in den neuen Leichttriebwagen Baureihe 628 der Deutschen Bundesbahn]
After an appraisal of the rail-bus, the author sets out the conditions to be met by a diesel railcar for short-distance service, and discusses in detail the basic concept of the drive, the base plan, the coach body design and the interior furnishings, also the power unit and running gear. Special importance is attached to design measures to reduce noise. [German]

Zboralski, D *Eisenbahntechnische Rundschau* Vol. 23 No. 1, Nov. 1974, pp 435-446, 15 Fig., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, 61 Darmstadt, West Germany Repr. PC

03 080337
COUPLERS AND TRUCK SECUREMENT. PHASE 10 REPORT
Phase 10 of the RPI-AAR Tank Car Safety Project was established to study the influence on tank car behavior in accidents of all non-tank components of a tank car. Of these components, couplers and trucks were later selected as the only significant items for study. The influence of couplers on tank car accidents was evidenced by the accident data collected for the years 1965 through 1970. During this 6 year period, 173 tank cars incurred head punctures, and of these, 148 were known to have been caused by couplers on adjacent cars. The data also showed that truck components, particularly wheels, often punctured tank car shells. Finally, of interest was the influence on the severiry of derailments (i.e. number of cars derailed and degree of jackknifing) of various coupler deisgns and the concept of truck securement. The purpose of this report is to review and discuss the results of the studies and to draw conclusions regarding functional efficiencies of current and modified coupler and truck designs toward improving tank car safety in accidents.

An RPI-AAR cooperative program.

Sims, RD
Association of American Railroads Research Center, (T-5-1) Final Rpt. RA-10-2-19(R-142), Sept. 1973, 35 pp, 7 Fig., 13 Phot.

ACKNOWLEDGMENT: Association of American Railroads Research Center
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080339
TANK CAR HEAD STUDY. PHASE 05 REPORT
During initial planning of the RPI-AAR Tank Car Safety Project, it was known that tank car heads were punctured in accidents with sufficient frequency to warrant assigning a specific Project Phase (05) for its study. The sequence of analyses and tests that were conducted under this phase were: Analysis of scale model laws for establishing feasibility of reduced scale tests; Preliminary drop weight tests on 1/12 scale tank car heads; Head impact tests on full scale old rivited tank cars; Development of head protection schemes and related cost/benefit analyses under contract to DOT; Head impact tests on 1/5 scale pressure and non-pressure cars with and without sill-head reinforcements; Head impact tests on 1/5 scale 112A340W pressure cars; Head impact tests on full scale new pressure cars to evaluate final head shield design; Analysis of all tests to correlate data, evaluate sensitivity of parameters, and predict degree of protection offered by final head shield design under various accident conditions. The purpose of this final Phase 05 Report is to present all the results under one cover, discuss them, and draw conclusions.

An RPI-AAR cooperative program.

Phillips, EA
Association of American Railroads Research Center, (T-5-1) Final Rpt. RA-05-1-17(R-140), July 1972, 119 pp

ACKNOWLEDGMENT: Association of American Railroads Research Center
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080367
RESIDUAL STRESSES IN THE PLATE FILLETS OF TWENTY-EIGHT-INCH DIAMETER WROUGHT STEEL WHEELS
Past experience with the B-28 wheel has shown that this design is susceptible to plate cracking. This reports the results of a program to determine the state of residual stress in class U untreated and class B heat-treated wheels. Measurements were made according to the procedure outlined in the AISI Steel Products Manual for Wrought Steel Wheels and Forged Railway Axles. Measurements were taken at the front hub-plate fillet and the back rim-plate fillet on each wheel. While the maximum principal residual stresses developed in the class B wheels were two to four times higher than those developed in the class U wheels, analysis by Goodman diagram shows similar fatigue properties in both wheels.

Direct requests to the Director's Office, AAR Technical Center, Chicago, Illinois.

Stone, DH
Association of American Railroads Research Center, (R-026) R-158, May 1974, 11 pp, 7 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080370
EXTENSION STUDY OF TANK CAR BOTTOM FITTINGS-EXECUTIVE SUMMARY. PHASE 09 REPORT
In its previous study of accident data over the 1965-1970 period, the RPI-AAR Tank Car Safety Project found that the most vulnerable tank car fitting was the bottom outlet on stub-sill non-insulated non-pressure class 111A cars. However, no cost-effective means were found to protect these outlets. In the final report RA-09-1-24, it was stated that with more current accident data and additional design ingenuity, this cost effectiveness picture may be altered. As a result, this Phase 09 extension effort was undertaken. Comprehensive studies were made of: 1) All accidents involving damage to bottom fittings during the 3 year period 1971-1973 2) Current designs of bottom fittings 3) Populations of tank cars with various bottom fitting designs 4) Numerous design solutions to reduce bottom fittings vulnerability (26 for new cars and 19 for existing cars) 5) Current tank car shipper/receiver practices and philosophies regarding top and bottom loading and unloading of tank cars. With this background, cost-effectiveness calcualtions were made for solutions for all classes of cars. As found previously, the cars with the most vulnerable bottom fittings were the stub sill cars.

Direct requests to the Project Directors Office, Earl Phillips.

Phillips, EA
Association of American Railroads Research Center, (RQ-09-2-27) Final Rpt. R-161, May 1974, 111 pp, 8 Fig., 13 Tab., 6 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080374
METALLURGICAL ANALYSIS OF FAILED RIMS ON FIVE BURLINGTON NORTHERN UNIT TRAIN TRUCK BOLSTERS
Results of fracture analysis, dimensional study, chemical analysis, Brinell hardness tests, and examination of the microstructures of five failed unit train truck bolster castings are reported. It was concluded that the failures were all triggered at the rim-bowl base fillet by various stress risers created by impacts of the horizontal liner plates against the rims. The failures propagated suddenly or in fatigue under impact of the rims with the body center plates. It was also found that the vertical liner rings had broken away from the rims of two bolsters before they were removed from service.

Direct requests to Directors Office, AAR Research Center.

Fleming, L
Association of American Railroads, (R015) R-152, Sept. 1973, 56 pp

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

03 080427
ULTRASONIC RAILROAD AXLE INSPECTION
This report describes the basic principles involved in the generation of ultrasonic waves and their general behavior in railway axles. Other topics

discussed include the operation of typical flaw detection instruments and methods useful in identifying true and false defect echoes.

Prepared by Oklahoma Univ., Norman. School of Aerospace, Mechanical and Nuclear Engineering.

Bray, DE
Transportation Safety Institute, Oklahoma University Final Rpt. TSI-R-74-100, Sept. 1974, 34p

ACKNOWLEDGMENT: NTIS (PB-237031/0ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-237031/0ST, DOTL NTIS

03 081265
STABILITY OF RIBBED PLATES IN THE CONSTRUCTION OF RAILWAY VEHICLES [Zur Stabilitat gesickter Bleche im Schienenfahrzeugbau]
In the case of plates with tailed-in ends, compressed along the ribbing, coupled elongations are produced as a result of bending deformation. These additional compression stresses are superposed upon the primary buckling constraints. For this reason, the elastic limit can be exceeded locally in ribbed walls, more especially in the intervention zone of the transversal forces. Other origins of this phenomenon can be: lack of precision in assembling, pre-existent deformations in the ribbed plates, residual welding tensions and the very asymmetrical form of the ribbing. Tests have been carried out in order to determine the bending stress. [German]

Haug, A *Leichtbau der Verkehrsfahrzeuge* Vol. 18 No. 3, May 1974, pp 58-63, 2 Tab., 6 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1188)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

03 081272
ONE STEP TOWARDS THE DEVELOPMENT OF THE NON-CONVENTIONAL WHEELSET [Ein Schritt auf dem Weg zum unkonventionellen Radsatz]
A lighter wheelset can be obtained by means of an assembly technique involving lower fixing stresses. A series of studies and assessments have revealed a possible solution: the DB has been experimenting with wheelsets assembled with adhesives, taking certain special precautions. Four of these adhesive-assembled wheelsets with low fixing stresses have now completed 250,000 km of trouble-free operation. A description is given of tests on a static model, on a rolling load fatigue testing machine, and operating tests. Excess tire contraction was only 0.45% in the case of adhesive-assembled wheelsets, as compared with 1.5% for hot shrunk fitted tires. [German]

Hegenbarth, F *Leichtbau der Verkehrsfahrzeuge* Vol. 18 No. 1, Jan. 1974, pp 9-12, 3 Fig., 4 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 914)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

03 081273
HIGH SPEED TRAINS HALVE THE TRAVELLING TIMES OF TODAY [Snabbtagen halverar dagens restider]
The SJ intends to construct a "curve-tilting" high speed unit with a speed limit of 200 km/h, which means that the travelling times on several lines will be halved. The objective is to be able to run fast on existing track. The low density of population in Sweden does not allow a straightening of track full of curves and development must therefore mainly be concentrated on the rolling stock. A survey of foreign experiences with different high speed systems is also given and an account of the technical limits with respect to developing conventional rolling stock for high speeds. [Swedish]

Knall, G *Teknisk Tidskrift* Vol. 104 1974, pp 21-26, 7 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 905)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

03 081276
FRICTION AND LUBRICATION OF WHEEL FLANGES [Spurkranzreibung und Spurkranzschmierung]
The authors examine the effect of wheel flange friction on the rails and the resistance to forward motion. They then consider measures aimed at reducing this friction by the use of special profiles and lubricants. Finally, they describe lubricating devices and their effects. [German]

Schmucker, B Kirchlechmer, H *Archiv fuer Eisenbahntechnik* No. 28, 1973, 15 pp, 17 Fig., 5 Tab., 16 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 916)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

03 081381
PROTOTYPE ELECTRIC RAILCAR (TYPE 961) FOR THE NATIONWIDE SHINKANSEN NETWORK
As the Shinkansen network is extended throughout Japan, the electric cars for these high speed passenger trains will encounter conditions differing from those for which the New Tokaido Line cars were designed. Differences in topography, climate and power supply are being met by a design which will have a new structure and new performance criteria. Six prototypes have been tested since August 1973. Main goals in their design are: (1) maximum speed of 260 kph; (2) the 12% grades, long tunnels and short station stops make necessary new traction capabilities; (3) through operation on 50 and 60 Hz power systems is necessary; (4) carbody insulation and resistance to entry of snow are emphasized; (5) design for maximum economies of mass production. Data from prototype tests will be fed into the final production car design.

Inoue, H (Japanese National Railways) *Japanese Railway Engineering* Vol. 15 No. 1, 1974, pp 4-8, 4 Fig., 1 Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

04 052505
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. INVESTIGATIONS ON A.C. MOTIVE POWER UNITS WITH SEVERAL THYRISTOR CIRCUITS (TESTS AND RESULTS OBTAINED FROM THE BLS-LOCOMOTIVE RE4/4 NO. 161)
This report concerns the tests undertaken with the BLS-Locomotive Re 4/4 161 fitted with several thyristor circuits. The object of the tests was to clarify the changes in the power factor and the harmonic wave content-the latter in view of its effects on signalling and telecommunication installations-resulting from the increased number of inverter steps and the limitation of the firing angle of the thyristor bridges to 35 degrees. The tests conducted have shown that in the case of thyristor-controlled motive power units, a multi-step control of the voltage regulation leads to a reduction of the harmonics of the line current and to an improvement in the power factor during acceleration and running below full power. The limitation of the firing angle of the thyristor bridges of 35 degrees, considered in its entirety, does not bring any advantages however.

International Union of Railways A122/RP6/E, Apr. 1973, 27 pp, 11 Fig., 5 Tab., 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

04 052506
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. TESTS WITH A STATIC FREQUENCY CONVERTER FOR 50-16 2/3 HZ
The Swedish State Railways (SJ) have conducted several comparative measurements on the Moholm-Skovde line, using a prototype of a static frequency converter (power 6 MVA) During the tests the equivalent disturbing currents and the weighted longitudinal e.m.f. induced in telecommunication circuits were measured; for these tests, the test line was fed through the static converter or through rotary converters. When the feeding took place through the static converter, the levels of the disturbing current in the overhead contact system and the induced weighted longitudinal e.m.f. were raised. However, a lowering of the levels measured may be expected, after the filter for the static converter has been modified. On the three-phase side there are no adverse effects, as long as the power of the static converter is very small in comparison with the short-circuit power of the high voltage network. The SJ have ordered, for two substations, two static converters each with a power of 15 MVA each.

International Union of Railways A122/RP8/E, Apr. 1973, 14 pp, 7 Fig., 1 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

04 052507
CONSTRUCTIONAL ARRANGEMENTS FOR IMPROVING THE RIDING STABILITY AND THE GUIDING QUALITY OF ELECTRIC AND DIESEL LOCOMOTIVES AND VEHICLES. INVESTIGATIONS CONCERNING THE RIDING PROPERTIES OF THE CO'CO' ELECTRIC LOCOMOTIVE AE6/6 11414 OF THE SWISS FEDERAL RAILWAYS (CFF)
Measurements have been made on this locomotive up to 200 km/h for estimating the influence of the constructional parameters of this type of motive power unit on the guiding forces arising between wheel and rail. Statements can be made concerning the most important points to be taken into consideration for reducing these forces.

International Union of Railways B10/RP13/E, Apr. 1973, 23 pp, 50 Fig., 1 Tab., 1 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

04 052514
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. CHOPPER CONTROL SYSTEMS
Within the scope of studies concerning possible interference induced in signalling and telecommunication installations caused by chopper-controlled motive power units, the Committee thought it useful to make a comparison between the various control systems. The present report contains a comparison of the control of choppers by varying the pulse frequency or pulse duration and it describes several possible solutions during the starting process. With a view to the high powers usually installed in motive power units, and, above all, with a view to the signalling and telecommunication installations on the railway administrations, the application of choppers operating at fixed frequencies is considered desirable.

International Union of Railways A122/RP 7/E, Apr. 1973, 28 pp, 5 Fig., Refs., 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

04 052558
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. STUDIES OF A.C. THYRISTOR LOCOMOTIVES FOR 15 KV 16 2/3 CYCLES AND THE EFFECT ON 100 HZ TRACK-CIRCUIT INSTALLATIONS (TESTS WITH OBB LOCOMOTIVE 1043)
The Austrian Railways have carried out extensive tests with 1043 class locomotives and ascertained the effect of a defect in the firing angle on the operating safety of track circuits working at 100 Hz. This report describes the measures which have been taken (a) on the locomotive and (b) on three different types of track-circuit installations to ensure that operation is not affected as a result of the running of thyristor locomotives either with single or double heading of trains.

International Union of Railways A122/RP 13/E, Apr. 1974, 30 pp, 22 Fig., 2 Tab., 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

04 057407
APPROXIMATE CALCULATION OF THE STATES IN WATER STORAGE VESSELS WITH BOILING AND NON-CONSTANT CONTENT AND WITH STEAM OR STEAM-AIR DISCHARGE [Naeherungsweise Berechnung der Zustaende in Wasserspeichern mit Siedendem und Nichtkonstantem Inhalt bei Dampf-Bzw. Dampf-Luft-Entnahme]
Water vessels with boiling and nonconstant mass of content are used as reservoirs for power stations and for fireless locomotives as well as for the power supply of exhaust jet pumps driven by hot water or steam, the jet pumps being installed in refrigerators, wind tunnels, units for separating dust particles or pollutant from the air. Moreover the water vessels are used as control units in nuclear power stations. Exact computation of the discharged mass and the states within the storage vessel is possible but complicated. In the case of steam discharge a simple approximate solution can be derived, taking into account addition of heat and the enclosure of an inert gas (air). The procedure is applicable to vessels with other boiling agents in the state of filling or discharging (e. g. bottles with liquid gas or propellant tanks for rockets). [German]

Hardegen, H (Deutsche Forschangs-u Versuchsanst f Luft-u Raumft) *Forschung im Ingenieurwesen* Vol. 40 No. 2, 1974, pp 47-59, 38 Ref.

ACKNOWLEDGMENT: EI (EI 74 606799)
PURCHASE FROM: ESL Repr PC, Microfilm

04 057413
PROBLEMS AND METHODS OF INTRODUCTION OF ELECTRONIC EQUIPMENT ON TRACTION VEHICLES [Problemi e metodi nell'introduzione dell'elettronica sui veicoli di trazione]
The article considers two main questions: which new techniques and where they should be introduced, and how they should be used. First, the electronic techniques that are possible today are considered and those that are most promising are evaluated. Secondly, the selection of the systems of application of these techniques, i.e., optimization of the results of these techniques, is discussed. Consideration is given to various types of converters for drive control. Perturbations caused by the use of static converters and perturbations to which electronic equipment is liable are discussed. [Italian]

Ferrazzini, P Rizzi, C *Ingegneria Ferroviaria* Vol. 28 No. 10, Oct. 1973

ACKNOWLEDGMENT: EI (EI 74 604264)
PURCHASE FROM: ESL Repr PC, Microfilm

04 057442
MAGNETIC CONTROL THYRISTOR CHOPPER EQUIPMENT FOR BATTERY VEHICLE
The following three major advantages were observed by adopting a magnetic phase shifter for gate control of a thyristor. 1. A single magnetic phase shifter can compare and amplify multiple signals in an insulated status. 2. At the same time, simplified current detection greatly reduces the number of parts required. 3. It is barely susceptible to the influences of noise. These facts imply that a magnetic phase shifter constitutes a highly reliable and low-cost control device. Especially, using this as a control unit for a chopper offers a substantial advantage with respect to the antinoise margin. By utilizing a balanced half-wave type magnetic phase shifter (capable of operating with a dc power source by combining with a switching transistor), we have developed a gate controller that is free from the influences of noise and allows control of current duties ranging from a minimum value to 100 percent maximum with a greatly simplified circuit.

This paper was presented at the 23rd IEEE Vehicular Technology Conference, Dallas, Texas, December 6-8, 1972.

Ibamoto, M Kiwaki, H Toyama, J Takei, K (Hitachi Limited) *IEEE Transactions on Vehicular Technology* Vol. VT23 No. 1, Feb. 1974, pp 19-22, 7 Fig., 2 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Vehicular Technology
PURCHASE FROM: ESL Repr. PC, Microfilm

04 057452
INFLUENCE OF SPEED AND AXLE LOAD ON THE CAPACITY OF ELECTRIC TRACTIVE UNITS [Einfluss von Geschwindigkeit und Achslast auf die Leistungsfahigkeit Elektrischer Triebfahrzeuge]
After describing the various factors influencing the measurement of performance of electric traction stock, the author discusses the effects of axle load in the case of locomotives and railcars. [German]

Bauermeister, K (German Federal Railway) *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 29-33, Figs.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

04 057455
NEW IMPULSES FOR THE THREE-PHASE—CURRENT DRIVE TECHNIQUE [Neue Impulse fur die Drehstrom-Antriebstechnik]
The Author describes the operating advantages of inverter-fed asynchronous motor drives. The present stage of progress is illustrated by examples of asynchronous motor operation taken from various countries. [German]

Teich, W (Brown, Boveri and Cie AG) *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 45-51, Figs., Phots., 12 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

04 057508
THOUGHTS ON THE CHANGES IN THE TRACTION MODES OF THE GERMAN FEDERAL RAILWAY
The replacement of the steam locomotives as a first phase in the change of traction mode, the reduction in énergy consumption and the trend of train and gross tonne kilometrages over the last twenty years or so reflect the activities of the German Federal Railway in the sphere of traction. The conversion from steam to diesel and electric traction has had a profound effect not only on the appearance but also on the user of the locomotives concerned. But the conversion has also had an effect on maintenance and servicing, on the depots and repair shops, on their organization and, especially, on their staff. Technical processes such as rationalization and automation have made their own contribution to this development. The successes derived from the change of traction mode have been matched by hardly any other measure taken by the German Federal Railway.

Frey-Graf, H (German Federal Railway) *Rail International* No. 3, Mar. 1974, pp 211-32, 17 Fig., 2 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

04 057516
SKODA DEVELOPS A SECOND GENERATION OF ELECTRIC LOCOMOTIVES
With dual-voltage prototypes on trial in Czechoslovakia and a 200 km/h eight-axle passenger locomotive of 8,400 kW due for delivery to Soviet Railways later this year, the Skoda Works at Plzen is now preparing for fundamental changes in its production range.

Railway Gazette International Vol. 130 No. 6, June 1974, pp 221-223, Figs

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

04 057518
SAR'S SERIES ORDER FOR GEC CHOPPERS
Successful tests with the two sets of 3 000 V dc chopper control equipment ordered from GEC Traction Limited by South African Railways in 1970 has led to the first series production order for 24 EMU power cars.

Railway Gazette International Vol. 130 No. 6, June 1974, p 227, 1 Fig.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

04 057522
SOVIET PROTOTYPES RAISE ELECTRIC AND DIESEL POWER RATINGS
An increase in the weight and speed of freight trains, which must also run at closer intervals, is now a strongly marked trend on the Soviet Railways. Intervals between trains on busy main lines are now around 7 or 8 min. The need to carry still more traffic, often under severe climatic conditions, all points to more powerful motive power and rolling stock of higher capacity, coupled with automation and signalling improvements. But all this must go hand-in-hand with still higher standards of reliability, and thus locomotive developments in the USSR are subject to intensive prototype testing before series production begins.

Fufrianski, NA (Soviet Ministry of Railways) *Railway Gazette International* Vol. 130 No. 6, June 1974, pp 216-220, Figs., 2 Tab.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

04 057529
ON THE REGENERATIVE BRAKING OF DC MOTORS WITH AC SUPPLY
A new method is described in which the DC motor may regenerate power effectively to AC supply. The principle is similar to that with a DC chopper for regeneration of the power from DC motor to DC supply. In this new method, however, thyristor switches synchronizing to the AC supply are used instead of a DC chopper. The principle and the power calculations as well as experimental results are presented. From theoretical and experimental considerations it is clarified that there exist suitable trigger angles in the thyristor of the synchronizing switches.

Makino, T Harada, K *IEEE Transactions on Industry Applications* Vol. 1A10 No. 1, Jan. 1974, pp 123-127

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications
PURCHASE FROM: ESL Repr. PC, Microfilm

04 057530
SOLID-STATE INDUSTRIAL POWER AND CONTROL COME OF AGE
Application of solid-state equipment and techniques has produced motor drives that are more capable, more flexible, and more economical than ever before. Other kinds of power supplies and power conditioners have benefited similarly from the same equipment and techniques.

Harris, WR Morgan, RA *Westinghouse Engineer* Vol. 34 No. 3, July 1974, pp 66-73, 8 Fig., 3 Tab., 8 Ref.

ACKNOWLEDGMENT: Westinghouse Engineer
PURCHASE FROM: XUM Repr. PC

04 057726
LATEST SAR ELECTRICAL EQUIPMENT FOR MULTIPLE-UNITS INCLUDES 24 CHOPPER SETS
GEC Traction Limited supplies equipment for 479 motor-coaches and trailers for South African Railways 3-ft 6-in. 3,000-V d.c. suburban lines.

Performance specified is consistent with existing stock but 24 sets incorporating choppers follow prototype success. Dusty high-ambient conditions and electric storms dictate special provision while low seasonal temperatures on the Reef System require passenger heating.

Hawkins, DA *Rail Engineering International* Vol. 4 No. 5, June 1974, p 220

PURCHASE FROM: ESL Repr. PC, Microfilm

04 057729
A REPORT ON PROGRESS IN THE DEVELOPMENT OF THREE-PHASE TRANSMISSION FOR RAIL TRACTION
Trials as direct electric traction units with the asynchronous motor by DB and SBB, a motor coach on CTS Cleveland, USA, and a USSR locomotive conversion together with an order for six diesel-electrics of 2,500 hp from SBB are summarized and techniques briefly reviewed.

Teich, W (Brown Boveri) *Rail Engineering International* Vol. 4 No. 5, June 1974, p 235

PURCHASE FROM: ESL Repr. PC, Microfilm

04 071771
PHYSICALLY DETERMINED LIMITING VALUES OF THE OVERHEAD LINE PARAMETERS IN MOTOR VEHICLES WITH THYRISTOR CONTROL [Physikalisch Bestimmte Grenzwerte der Fahrleitungsnetzgroessen bei Triebfahrzeugen mit Thyristorsteueurng]
The advantages of using thyristors are discussed and compared with their disadvantages. Special emphasis is on drawbacks of thyristors in order to save the designer and user from certain pitfalls. A discussion is presented about the relationship between the current of the overhead contact system and the power factor, and steps to be taken in order to improve the latter. [German]

Lunden, H *Elektrische Bahnen* Vol. 44 No. 12, Dec. 1973

ACKNOWLEDGMENT: EI (EI 74 800309)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071776
UNDESIRABLE DYNAMIC PHENOMENA IN THE DRIVE SYSTEM OF A HIGH-SPEED ELECTRIC LOCOMOITVE [O Niepozadanych Zjawiskach Dynamicznych w Pewnej Odmianie Mechanizmu Napedowego Szybkobieznej Lokomotywy Elektrycznej]
The paper is devoted to the problem of dynamic loads acting on elements of the drive system of an electric locomotive with a transmission gear mounted on the wheel set near the motor which is entirely supported on the frame of the bogie. The causes of the loads considered are nonuniform work of the couplings transmitting the torque from the motor to the transmission gear and the vertical irregularity of the track. Conditions are analyzed under which the influence of the irregularity of the track is the weakest. [Polish]

Karasiewicz, T Madej, J *Archiwum Budowy Maszyn* Vol. 21 No. 1, 1974, pp 33-42, 15 Ref.

ACKNOWLEDGMENT: EI (EI 74 801028)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071778
ELECTROMAGNETIC ENVIRONMENTAL INFLUENCE BY MOTOR VEHICLES WITH GATING CONTROL [Elektromagnetische Umweltbeeinflussung Durch Triebfahrzeuge mit Anschnittsteuerung]
The electromagnetic environmental influence effects of telecommunication and signalling systems are considered. Types of coupling with the environment are discussed, along with influence by the harmonic oscillation of traction current and by higher harmonics. Conclusions are drawn as to outlooks in the future. [German]

Buckel, R *Elektrische Bahnen* Vol. 45 No. 1, 1974, pp 19-21

ACKNOWLEDGMENT: EI (EI 74 801952)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071787
THE STANDARD DIESEL LOCOMOTIVE M 1500 FOR OVERSEAS SERVICE [Die Standard-Diesellokomotive M 1500 im Einsatz in Uebersee]
Within the scope of a standardization program for diesel locomotives for overseas railroads, a considerable number of diesel locomotives of the series M 1500 were supplied to several railroad administrations. The structural principles established during the development of the locomotives are measured against the experience gained under varying operating conditions. [German]

Goerlitz, W Lechten, W *Glasers Annalen ZEV* Vol. 98 No. 4, Apr. 1974

ACKNOWLEDGMENT: EI (EI 74 802451)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071795
TRANSIENT PROCESSES IN THE POWER CIRCUITRY OF AN AC ELECTRIC LOCOMOTIVE WITH A THYRISTOR CONVERTER IN THE INVERTER OPERATING MODE [Perekhodnye Protsessy v Silovoi Tsepi Elektrovoza Peremennogo Toka S tiristornym Preobrazovatelem v Invertornom Rezhime]
Analog computer study of the transients is discussed and recommendations are made for the selection of stabilizing resistances during the protection of electric equipment by fast-response breakers. [Russian]
"Electric Technology" is the English translation of "Elektrichestvo."

Kopanev, AS Khomenko, BI *Electric Technology* No. 1, Jan. 1974, pp 60-65, 4 Ref.

ACKNOWLEDGMENT: EI (EI 74 804294)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071799
KRAUSS-MAFFEI STANDARD DIESEL LOCOMOTIVE M 500/700 C [Die Standard-Diesellokomotive M 500/700 C Von Krauss-Maffei]
Details are given on the use of the MTU motor series V 331 and the Voith turbo reversing gear Type L 4r4 and their incorporation into the overall locomotive concept employing quick-break joining elements. Special attention is given to combining various auxiliary units to speed up the replacement procedure and to reduce outages. [German]

Zoellner, F *Glasers Annalen ZEV* Vol. 98 No. 5, May 1974, 7 Ref.

ACKNOWLEDGMENT: EI (EI 74 805610)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071800
TRUCK FRAMES WITH TORSIONAL FLEXIBILITY FOR RAIL MOTOR CARS [Der Verwindungsweiche Drehgestellrahmen fuer Schienenfahrzeuge]
After giving the formula for the torsion moment, mention is made of the structural demands on truck frames. As an example, the corner joint between main and cross girders is described in detail. In addition to dealing with the critical force conditions, a number of suggestions are given for implementation of the design. [German]

Stave, G *Glasers Annalen ZEV* Vol. 98 No. 5, pp 137-144, 10 Ref.

ACKNOWLEDGMENT: EI (EI 74 805612)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 071806
BASIC PRINCIPLES FOR THE CONSTRUCTION OF ELECTRIC MOTOR VEHICLES WITH ASYNCHRONOUS TRACTION MOTORS [Grundlegende Gesichtspunkte fuer die Auslegung Elektrischer Triebfahrzeuge mit Asynchronen Fahrmotoren]
The use of semiconductor power devices in the commutatorless, three-phase asynchronous motor for traction is discussed. The advantages compared with commonly used commutator motors are pointed out. The power supply installations are described. The possibility of attaining a power factor greater than 0.96 at full load is reported. [German]

Koerber, J *Elektrische Bahnen* Vol. 45 No. 3, Mar. 1974, pp 52-59, 9 Ref

ACKNOWLEDGMENT: EI (EI 74 806862)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071812
CHOPPER CONTROL EQUIPMENT WITH REGENERATIVE BRAKE SUPPLIED TO TORONTO TRANSIT COMMISSION
An experimental conversion of 6 conventional resistor-controlled subway cars to chopper control was made. The 2-phase 600 v dc chopper equipment is capable of controlling eight 86 kw traction motors (per two cars) and provides 65% weak field controlling regenerative braking. All major components are designed to withstand severe service conditions in temperatures as low as-30 C. Computer simulation indicates that electric cars using this control system consume about 30% less power than resistor-controlled cars.

Konno, N (Mito Works); Tsuzuki, Y Narita, H *Hitachi Review* Vol. 23 No. 5, 1974

ACKNOWLEDGMENT: EI (EI 74 702572)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071813
NOVEL COMBUSTION CHAMBER CONCEPT OF DIESEL ENGINES [Une nouvelle chambre de combustion pour moteur diesel]
Data of an engine with variable geometry combustion chamber that has been developed and tested are presented. The efficiency is comparable with engine types with direct injection. Particular attention is paid to the fact that lower pollution rates are achieved, making such engines candidates for automobiles. Only a railroad engine was tested so far. [French]

Herrmann, R Brisson, R Eyzat, P Ecomard, A *Ingenieurs de l'Automobile* No. 3, Mar. 1974, pp 167-176, 3 Ref.

ACKNOWLEDGMENT: EI (EI 74 702576)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071815
DEVELOPMENT OF THE COOLING SYSTEMS OF DIESEL LOCOMOTIVES ON GERMAN FEDERAL RAILWAYS [Entwicklung der Kuehlanlagen in den Diesellokomotiven der Deutschen Bundesbahn]
The influence of the requirements imposed by the diesel engine and of corrosion and cavitation problems in high-power engines on the design of the cooling circuit is discussed. The various measures taken to obtain a simple and reliable cooling system and fan drive featuring minimum maintenance requirements are outlined. [German]

Feulner, A (Bundesbahn-Zentralamt, West Germany) *Glasers Annalen ZEV* Vol. 98 No. 3, Mar. 1974, pp 17-78, 10 Ref.

ACKNOWLEDGMENT: EI (EI 74 703929)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 071821
4,000 KW FAMILY OF SNCF LOCOMOTIVES FOR A. C. AND D. C. MAIN LINES
Continuous ratings vary from 4,400 kW to 4,600 kW according to the speed; all are designed for 180 km/h and axle loadings are 21. 2, 22. 3 and 22. 6 tons. All three classes incorporate important common assemblies, such as the bogies, traction motors, body frame and structures. Solid-state circuiting, including thyristors, provide the stepless adjustment of the traction motor voltage and field. Rectifier control is associated with automatic regulation to provide pre-set current, pre-set speed and automatic change-over to electric braking and selective motor wheel-spin protection.

Boileau, R (French National Railways) *Rail Engineering International* Vol. 4 No. 3, Apr. 1974

ACKNOWLEDGMENT: EI (EI 74 705794)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071822
DIESEL ENGINE TO UIC TRACTION LOADING GAUGE REQUIREMENTS WITH 400 HP/CYLINDER POTENTIAL
The general particulars of the PA6-280 engine are: bore 280 mm, stroke 290 mm, rev/min 1,050, nominal power 350 hp/cylinder (in the initial development stage), piston speed 10 to 15 m/sec, m. e. p. 16. 7 bars and specific output 57 hp/dm//2 of the piston. A cross-sectional review is shown, illustrating engine component arrangements.

Gallois, J *Rail Engineering International* Vol. 4 No. 3, Apr. 1974

ACKNOWLEDGMENT: EI (EI 74 705795)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071831
METROLINER UPDATED TO IMPROVE RELIABILITY AND MAINTAINABILITY
While the Metroliners have achieved a high degree of public acceptance and are a competitive mode of transportation in the Northeast Corridor, they have been plagued by availability problems which the U.S. Department of Transportation has sought to overcome with its Metroliner Updating Program. Westinghouse Transportation Division has modified two of the four prototype cars in this program. Modifications are aimed at improving reliability by simplifying functions; increasing margins on components; and reducing shock, vibration, heat, dirt and electrical noise. Maintainability has been improved so that a predicted 80% of all malfunctions can be diagnosed and repaired during the turnaround periods between runs.

Westinghouse Engineer Vol. 34 No. 4, Oct. 1974, p 122, 1 Phot.

PURCHASE FROM: XUM Repr. PC

04 071936
IMPUT POWER CHARACTERISTICS OF A THREE-PHASE THYRISTOR CONVERTER
A phase delay rectifier operating into a passive resistive load was instrumented in the laboratory. Techniques for accurate measurement of power, displacement reactive power, harmonic components, and distortion reactive power are presented. The characteristics of the phase delay rectifier operating with unfiltered and inductively filtered resistive loads are presented using both derivations and measurements. The changes of the phase delay rectifier characteristics with a free wheeling diode in the circuit are also presented. /Author/

Wlodyka, RA Abbas, JD Ploetz, G
Transportation Systems Center, (DOT-TSC-FRA-73-4) Final Rpt. FRA-ORD/D-74-20, Oct. 1973, 90 pp

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-226281/4, DOTL NTIS

04 071993
THRYSTOR-EQUIPPED MOTOR VEHICLES AT THE FRENCH RAILROADS SYSTEM [Les engins moteurs a thyristors a la S.N.C.F.]
Single-phase vehicles are discussed and their basic circuit diagrams analyzed. These incorporate thyristors which are used for: voltage control, the control of the induction field, and protection against excessive speed. Direct-current motor vehicles are also analyzed and the functions of the incorporated thyristors are discussed. Applications for various trains or locomotives are considered. [French]

Cossie, A (French National Railways) *Association Suisse des Electriciens Bulletin* Vol. 65 No. 5

ACKNOWLEDGMENT: EI (EI 74 900405)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071994
SUBURBAN TRAINS USING THYRISTORS [Rames de banlieve a thyristors]
The composition of suburban trains is presented from the viewpoint of utilization criteria which are prevalent in Switzerland in order to meet the requirements of public transportation in the suburbs on existing railroad networks. The possibility of achieving improved performance is considered. Modern electric equipment incorporating thyristors is described. The concept of electronic control and further extensions are discussed. [French]

Schaffner, JC (Ateliers de Secheron, Switzerland) *Association Suisse des Electriciens Bulletin* Vol. 65 No. 5, 5 Ref

ACKNOWLEDGMENT: EI (EI 74 900404)
PURCHASE FROM: ESL Repr PC, Microfilm

04 071995
HIGH-POWER MOTORS FOR ELECTRIC MOTOR VEHICLES [Hochleistungsmotoren fuer Elektrische Triebfahrzeuge]
The use of the concept high-power motor for driving motors in electric motor vehicles is explained with the aid of speed-traction diagrams. The limiting electric and mechanical quantities are surveyed. The development

of locomotive motors is described by means of an illustrative example dealing with multi-purpose locomotives for the Swiss railroad system. Advantages of collectorless three-phase traction motors are pointed out. [German]

Moser, R (Brown Boveri); Pinter, B *Association Suisse des Electriciens Bulletin* Vol. 65 No. 5, 03, 15 Ref

ACKNOWLEDGMENT: EI (EI 74 900403)
PURCHASE FROM: ESL Repr PC, Microfilm

04 072447
E60C ELECTRIC LOCOMOTIVES FOR THE BLACK MESA AND LAKE POWELL RAILROAD
A new 50-kV 60-Hz electric locomotive has been designed to meet American railroad standards and requirements. This new locomotive has been designated the E60C, with a nominal rating of 6000 equivalent diesel horsepower (4500 kW). Many of the design features of the locomotive are described. In order to operate 125 km (78 mi) from the substation, provisions were made in the locomotive circuits for operation at line voltages as low as 50 percent of nominal.

McSparran, LW (General Electric Company) *IEEE Transactions on Industry Applications* Vol. IA10 No. 3, May 1974, pp 385-390, 11 Fig., 2 Tab., 2 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications
PURCHASE FROM: ESL Repr. PC

04 072476
THE BART CAR SYSTEMS AND MAINTENANCE PHILOSOPHIES
This paper briefly reviews the propulsion, auxiliary electrical and miscellaneous eletrical systems selected for use on the San Francisco Bay Area Rapid Transit cars. It also discusses the general maintenance philosophies and activities of the Rolling Stock and Shops Division as they were anticipated for full BART system operation.

Van Eck, RA (South Broward Transit); Grief, N (Bay Area Rapid Transit District) *IEEE Transactions on Industry Applications* Vol. IA10 No. 5, Sept. 1974, pp 353-359, 4 Fig, 1 App.

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072490
SYNCHRONOUS MOTOR RAILCAR PROPULSION
Development of ac motor drives for rail transit car propulsion has centered on the induction motor with PWM inverter control. Interest in the induction motor as a replacement for the series dc traction motor stems from the simplicity of the squirrel cage rotor of the induction motor. In this article, the shortcomings of PWM inverter-induction motor transit car drive are examined. It is shown that the synchronous, or brushless dc, motor drive can provide performance exceeding both the PWM inverter-induction motor and the conventional dc motor in the transit car application.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Bourbeau, FJ (General Motors Corporation)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A)
Proceeding Part 1, 1974, pp 533-541, 11 Fig., 20 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072491
INVERTER-INDUCTION MOTOR DRIVE FOR TRANSIT CARS
The advent of large power semiconductors has made it possible to apply inverters and ac motors to traction applications. Either synchronous or induction motors and several types of power converters can be considered. The induction motor and the pulse width modulated (PWM) inverter are selected as favorable for application to a transit car drive. A general method of sizing the PWM inverter and induction motor in terms of the car performance requirements is outlined. This method results in a minimum size inverter and allows optimization of system weight and cost. A discussion of wheel size effects and the optimization of regenerated energy is included.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Plunkett, AB Plette, DL (General Electric Company)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A)
Proceeding Part 1, 1974, pp 521-531, 17 Fig.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072496
THE APPLICATION OF THE DC-DC CHOPPER IN TRACTION SERVICE
The advances made in power semiconductor technology have made possible new types of power controls for traction motors. These controls have opened the way for stepless performance, separately excited DC traction motors, AC brushless traction motors and regenerative braking. One of these controls, the DC-DC chopper is now in regular service on transit and railway systems such as BART, TEITO (Tokyo), Wuppertal (Germany), Belgium and Brazil. This paper explores the characteristics of chopper types, chopper circuits and performance of the series chopper and concludes with an economic evaluation of the chopper compared with the conventional resistor controller as well as AC motor inverter drives.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Van Eck, RA (Rohr Industries, Incorporated)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A)
Proceeding Part 1, 1974, pp 307-314, 8 Fig., 14 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072554
RUBBER SUSPENSIONS FOR RAIL VEHICLES—APPLICATION AND EXPERIENCE
The use of rubber suspensions results in simpler running-gear requiring only limited maintenance. Solutions must be based on knowledge of stresses in service and riding quality requirements. Experience has shown benefits in riding, maintenance and weight.

Koffman, JL Reed, AJ (Dunlop Limited) *Rail Engineering International* Vol. 4 No. 7, Sept. 1974, pp 307-312, 12 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

04 072591
A PRACTICAL METHOD TO CALCULATE TRANSIENT ELECTRICAL HEATING IN A D.C. MOTOR
A simple method is presented to accurately predict the transient rise by resistance of the copper parts of a traction motor undergoing continuously varying load, speed and ventilation. A twelve node model is used with certain selected heat transfer parameters adjusted based on heat runs made on the machine. The results of a test are given comparing the method with actual measured values on a "cyclic" heat run.

Proceedings of the Ninth Annual Meeting of the IEEE Industry Applications Society, 7-10 October 1974, Pittsburgh, Pennsylvania.

Hokanson, PR (General Electric Company)
Institute of Electrical and Electronics Engineers Proceeding Oct. 1974, 34 pp, 13 Fig.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072691
COMULATIVE SAMPLING TECHNIQUE FOR INVESTIGATING THE SCAVENGING PROCESS IN TWO-STROKE ENGINES
Investigates the progress of scavenging in a two-stroke engine cylinder. On the basis of a simulated model, it is shown here that cumulative sampling is a simple and reliable technique to determine the progress of scavenging. Under cumulative sampling, samples of exhaust gases are collected during the exhaust period over different intervals all of which start at the com-

mencement of blow-down. The method of analysis of the exhaust concentration-time distribution is also given.

This paper was prepared for an ASME Meeting 28 April-2 May 1974.

Kannappan, A (Chalmers University of Technology, Sweden)
American Society of Mechanical Engineers Paper N 74-DGP-11, 13 pp, 28 Ref.

ACKNOWLEDGMENT: EI (EI 74 063096)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072702
MODEL OF DEPOSIT FORMATION ON DIESEL ENGINE PISTONS

In contrast to the well-known chemistry of deposit formation little is known about mechanical and physical factors governing these reactions. Several observations such as bulk oil oxidation in relation to piston temperatures, depletion of alkaline additives, cylinder wall drying of crankcase oil and the mechanism of oil consumption lead to the conclusion that in a running engine, there must exist an intensive oil circulation between the piston-cylinder zone and the oil sump. Based on this conception a more detailed description of phenomena leading to deposit formation is possible, showing more concrete terms of lubrication requirements and the possibility to reduce these requirements by means of constructive measures. [German]

Ruedinger *Erdoel und Kohle-Erdgas-Petrochemie* Vol. 27 No. 7, July 1974, pp 353-358, 78 Ref.

ACKNOWLEDGMENT: EI (EI 74 061601)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072765
TRACTION DIESEL-ENGINE CYLINDER-LINER WEAR ON INDIAN RAILWAYS

Study on conditions brought about by high rates of cylinder-liner wear under service conditions leading to data collection on 170 locomotives embracing 2,200 cylinders. Examination of performance life of indigenously-produced liners and those imported. Combustion gas-pressure effect on ring/cylinder-bore contract pressure and its effect on lubrication during the working cycle was also examined. Attrition, abrasion, and corrosion wear are discussed along with application of chromed-liners.

Syngal, SP Bhalla, P (Indian Railways) *Rail Engineering International* Vol. 4 No. 8, Oct. 1974, pp 387-392, 6 Fig.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072777
BOGIE AND TRACTION ASPECTS OF HIGH SPEED LOCOMOTIVE DEVELOPMENT ON ITALIAN STATE RAILWAYS

Need for greater power to meet 180-200 km/h speeds with trains of 700 to 800 tons, resulted in the design of a 6300 kW locomotive. Test reports are given for bogies evaluated beneath a mock-up weighted locomotive body. Weight transfer between the axles of each bogie during acceleration has been avoided by the transmission of transition forces from a point near rail level. Weight transfer between the bogies is eliminated electrically. Data are charted on motor ratings, wheelbase, weight, dimensional details, etc.

Giovanardi, G *Rail Engineering International* Vol. 4 No. 6, July 1974, pp 258-265

ACKNOWLEDGMENT: EI (EI 74 071019)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072778
INFLUENCE OF THE CONFIGURATION OF ALSTHOM COUPLINGS IN LOCOMOTIVE DRIVE SYSTEMS ON THE LOADS ACTING ON THE HOLLOW SHAFT AND ITS BEARINGS [Wplyw Wzajemnego Ustawienia Sprzegiel Typu Alsthom w Ukladach Napedowych Lokomotyw na Obciazenia Walu Drazonego i Jego Lozysk]

A discussion is presented of Alsthom couplings which are used, among other applications, for drive systems of electric locomotives. Using equations which describe the kinematic features of the coupling, the problem of transverse dynamic loads acting on the end of the hollow shaft is studied, the forces being produced by the inertia of a single Alsthom coupling deflected from its middle position. Equations of equilibrium of elements of the coupling are established and solved in the first approximation by the perturbation method. Next, the necessary relations between the configuration of the couplings at the wheel set and the configuration of the loads acting on the ends of the hollow shaft are established and used to determine the dynamic reactions of the bearings acting on the hollow shaft. Results of this analysis make possible design conclusions concerning the configuration of the couplings. [Polish]

Grzyb, A Romaniszyn, Z *Archiwum Budowy Maszyn* Vol. 21 No. 2, 1974, pp 229-255, 7 Ref.

ACKNOWLEDGMENT: EI (EI 74 071018)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072780
TELOC-E: A NEW ELECTRONIC SPEED AND DISTANCE MEASURING SYSTEM FOR RAILWAYS

The Teloc-E system consists of newly developed instrumentation which can be assembled in modules to give simple tachometer units or complex minicomputers for onboard train applications. Measuring is based on a pulse frequency proportional to the wheel rpm and corrected for changes in diameter. The instrumentation works digitally for the most part and is capable of performing most duties associated with the indication, recording and processing of the distance covered, speed and acceleration.

Winker, E *Hasler Review* Vol. 7 No. 1, June 1974, pp 7-23

ACKNOWLEDGMENT: EI (EI 74 071014)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072782
DESIGN AND APPLICATION OF TRACTION MOTORS FOR ELECTRIC VEHICLES

The design of electric traction motors for electric vehicle applications requires intimate knowledge of the vehicle mission and performance requirements and a systems approach involving integration of the motor into the entire electrical power system. Motor characteristics are reviewed, speed control possiblities are discussed, and factors to be considered in the application and selection of traction motors are explained in detail.

Presented at the SAE Meeting on Sept. 9-12, 1974.

Lindhorst, PK (Gould Incorporated); Andreas, JC
Society of Automotive Engineers Preprint #740729, Sept. 1974, 4 pp

ACKNOWLEDGMENT: EI (IE 74 069550)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072786
USES AND MISUSES OF SCR'S

Silicon controlled rectifiers are basically on-off switches, similar to a diode, but modified to block voltage in the forward direction until it has been gated-on. Their switching action controls power to a load by frequency, current and voltage modulation, as in dc to ac and ac to dc converters. All SCR's are not the same, however, and it is important to determine which operating parameters and characteristics are essential early in the design stage. Too often the SCR is chosen after driver circuits, loads, and other circuit requirements are finalized. When SCR's fail in an inverter circuit, for example, the cause could be overvoltage or overcurrent, or the turn-off time might be too long. Or perhaps the voltage wavefront is too sharp, or the wrong gate drive was used. In any event, the reasons for the failures may not be found in the specification sheets. It may be necessary to consult the manufacturer directly to find a solution.

Hunt, SR Balenovich, JD Sherbondy, GM *Electronic Products Magazine* Vol. 17 No. 4, Sept. 1974, pp 36-43

ACKNOWLEDGMENT: EI (EI 74 069539)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072793
SOME QUESTIONS OF THE METHOD OF INVESTIGATING THE SERVICE RELIABILITY OF WELDED STRUCTURES

The method of investigating the service reliability of materials and welded structures should include the determination of their resistance to fatigue and brittle fracture, which is usually determined experimentally. In this investigation of welded locomotive truck frames, it is necessary to repro-

duce, to the greatest extent possible, the type of service failure and conditions determining the efficiency of structures.

Kraichik, MM Ratner, RS *Welding Production* Vol. 21 No. 2, Feb. 1974, pp 86-90, 6 Fig., 16 Ref.

ACKNOWLEDGMENT: EI
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072867
SOLID-STATE CONTROL OF ELECTRIC DRIVES
A tutorial review of the dc and ac electric-drive field is presented. The goal is to present fundamental concepts, principle concerns, and key developments in electric-drive technology. Principles of ac and dc power converters and ac and dc motors are presented. Then the combination of the converter and motor to provide a complete drive system is discussed along with drive-system characteristics and methods for analyzing performance. Finally, some application guidelines for both ac and dc systems are given.

Schieman, RG Wilkes, EA Jordan HE (Reliance Electric Company) *Institute of Electrical and Electronics Engrs Proc* Vol. 62 No. 12, Dec. 1974, pp 1643-60, 54 Fig., 39 Ref.

ACKNOWLEDGMENT: Institution of Electrical Engineers, Proceedings
PURCHASE FROM: ESL Repr. PC, Microfilm

04 072960
A GLOSSARY OF NEW LOCOMOTIVE TYPES
All familiar electric and diesel main-line locomotives on British Rail are probably obsolete in design in modern engineering terms, according to the author. This article is a general guide to the various new types of motive power now entering service. A brief explanation is given of the normal functioning of each type, followed by a review of the evolution of that type on various European railways. No claim is made to list every locomotive design in each category. Locomotive includes also electric and diesel rail cars since contemporary traffic requirements are tending to blend the three concepts together.

Kalla-Bishop, PM *Modern Railways* Vol. 31 No. 314, Nov. 1974, pp 441-444, 2 Fig., 3 Phot.

PURCHASE FROM: XUM Repr. PC

04 072988
A NEW BRAKE-REVERSING TRANSMISSION FOR SHUNTING WORK
Locomotives used in shunting operations require 1) power acceleration with smooth stepless development of tractive effort, 2) steady change of load and speed, 3) rapid reversing, 4) uniformly high braking effort without wearing parts, 5) easy control and operation, and 6) simple and rugged design to ensure trouble-free running. AEG (Allegemeine Electricitaers Gesellschaft) has developed the Ser 311-Fottinger transmission. Characteristics include: power up to 280 HP; compact design; high turbine moment is obtained when starting; the torque converter gives smooth acceleration, adjusting automatically to the load; friction-disc reversing clutches are made of non-wearing sinter-bronze and steel; and most importantly, it can be reversed while the locomotive is still moving. In fact, it is possible to reverse at speeds of up to half maximum. The Sar 320 has also been developed by AEG for use on multiple-unit stock for medium and long distance services, consisting of up to 6 or 8 cars. It uses force locking reverse clutches. The arrangement is advantageous on extensive railway systems with long intervals between stations. It permits the use of very simple transmissions with a minimum of control equipment.

Eisenbahntechnische Rundschau No. 11, Dec. 1969, pp 20-22, 2 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, 61 Darmstadt, West Germany Repr. PC

04 080083
ELECTRIC VEHICLES AND POWER SUPPLIES FOR HIGH-SPEED RAIL TRAFFIC [Elektrische Fahrzeuge und Energieversorgung fuer Schienenschnellverkehr]
This article describes rail dynamics at high speeds and the bearing these have on the design, power, running gear and brakes of electric traction stock. The increased powers required for high-speed vehicles are examined, and the necessary changes in the overhead contact line with respect to elasticity and conductance described. [German]

Bauermeister, K *Eisenbahntechnische Rundschau* Vol. 23 No. 9, Sept. 1974, pp 335-339, 2 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

04 080310
ELECTRIC EXPRESS LOCOMOTIVES FOR FUTURE TRAIN SERVICES OF THE ITALIAN STATE RAILWAYS [Elektrische Schnellzuglokomotiven fuer die kuenftige Zugforderung der Italienischen Staatsbahnen]
The Italian State Railways' new locomotive building program includes two six-axle types for heavy trains on the future intercity express service. The author describes the basic planning considerations and design of the E 666 Co'Co' 200 kph locomotive and also the E656 Bo'Bo'Bo' locomotives for 160 kph developed from existing types. [German]

Messerschmidt, W *Eisenbahntechnische Rundschau* Vol. 23 No. 1, Nov. 1974, pp 456-462, 9 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra[Verlag Hernichel und Dr. Strauss, 61 Darmstadt, West Germany Repr. PC

04 080346
CRC ENGINE DEPOSIT RATING TECHNIQUES—IMPROVEMENTS IN THE USA
A need to improve the precision of the methods for describing relative deposit levels found in internal combustion engine has prompted concentrated efforts through the Coordinating Research Council (CRC). New comparative color scales, uniform diesel piston rating environment conditions and an improved numerical system for rating diesel piston deposits are being developed. Improved methods of rating rust deposits are being studied. The method used to differentiate between various degrees of relatively light sludge deposits is also being re-evaluated. The paper represents a progress report on the CRC activity.

Presented at the 5th Symposium, Performance Test of Lubrication for Automotive Engines and Transmissions, Montreaux, Switzerland, April 2-6, 1973.

White, BF (Automotive Research Associates Incorporated); Knight, JW Applied Science Publishers Limited Proc. Paper No. 9, 1974, pp 117-127

ACKNOWLEDGMENT: EI (EI 74 076378)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 080351
APPLICATION AND TESTING OF GAS TURBINES IN TRACTION VEHICLES ON GERMAN FEDERAL RAILWAYS [Anwendung und Bewaehrung von Gasturbinen in Triebfahrzeugen der Deutschen Bundesbahn]
The gas turbine was tested as booster unit in their locomotive 210001 and subsequently equipped 8 Series 210 locomotives with gas turbine booster drives. Later on, 4 high-speed fast railcars units of Series 602 were provided with gas turbines as main propulsion units. The article reports on the design features of this propulsion unit and on the operating experience. [German]

Fwulner, A *Glasers Annalen ZEV* Vol. 98 No. 7-8, July 1974, pp 199-209, 17 Ref.

ACKNOWLEDGMENT: EI (EI 74 078223)
PURCHASE FROM: ESL Repr. PC, Microfilm

04 080358
REVENUE SERVICE OPERATION-1973. AC PROPULSION PROJECT
In 1971, the Cleveland Transit System received a grant contract from the Department of Transportation's , Urban Mass Transportation Administration to test, demonstrate, and evaluate a solid state AC propulsion system on three rapid transit cars (Project OH-06-0006). The AC propul-

sion system was developed by the Westinghouse Air Brake Division, Westinghouse Air Brake Company (WABCO), Wilmerding, Pa. This report is one of a series on various aspects of the project. This report discusses the integration of three AC powered cars into the Cleveland Transit System's revenue operation during 1973. The year of operation was divided into two distinct operating periods. In the first period, January through June, the three AC cars were not compatible with the remaining Airporter fleet. During the second period, July through December, the three AC cars were modified in such a manner as to render them compatible with the DC cars and were operated the remainder of the year in mixed service.

Prepared by Westinghouse Air Brake Division, Westinghouse Air Brake Company for Cleveland Transit System.

Smith, RD Skantar, ET
Cleveland Transit System, (OH-06-0006) Tech. Rpt. UMTA-OH-06-0006-74-1, Apr. 1974, 73 pp

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS Repr. PC

04 080359
MULTIPLE CAR PERFORMANCE, AC PROPULSION PROJECT
In 1971 the Cleveland Transit System received a grant contract from the Department of Transportation's Urban Mass Transportation Administration to test, demonstrate and evaluate a solid state AC propulsion system on three rapid transit cars (Project OH-06-0006). The AC propulsion system was developed by the Westinghouse Air Brake Division, Westinghouse Air Brake Company (WABCO), Wilmerding, Pa. This report is one of a series on various aspects of the project. To demonstrate general performance and applicability of the propulsion system, an on-board computer controlled data acquisition system was used to collect performance data. The data were reduced, analyzed, and plotted by computer. This report presents the performance data collected during the multiple car operation. The general performance characteristics are displayed by means of graphs plotted by computer from the raw data. Detailed discriptions of the data system and single car performance results are reported separately in UMTA-OH-06-0006-73-1 and UMTA-OH-06-0006-73-3 respectively.

Cymbor, WP Smith, RD
Cleveland Transit System, (OH-06-0006) Tech. Rpt. UMTA-OH-06-0006-74-2, Mar. 1974, 49 pp

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS Repr. PC

04 080415
RESEARCH ON A GENERATOR FOR THE ELECTRIC POWER SUPPLY ON GEV-1 RAILROAD CARS
Results are given of experimental research on a GEV-1 generator for the electric power supply for railroad cars. A silicon three-phase bridge rectifier unit (VK2-200) is used for rectifying the alternating current. The power produced by the generator on the direct current side is 15.8 kilowatts with a rotation speed of 900-3000 rpm. The characteristics of the machine, efficiency factor of the sinusoidal stress curve when idling, and the load with the rectifier and without it are given. Magnetic measurement was done on some parts of the machine's magnetic circuit and the leakage coefficient was determined.

Trans. of Beskontaktnye Elektricheskie Mashiny (USSR) v11 p291-304 1972.

Daugulis, KL Kurkalov, II
Army Foreign Science and Technology Center FSTC-HT-23-0421-74, May 1974, 17p

ACKNOWLEDGMENT: NTIS (AD/A-000241/0SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-000241/0SL, DOTL NTIS

04 080765
WHICH TYPE OF ELECTRIC MOTIVE POWER?
European railways favor a high horsepower-to-weight ratio and truck mounted traction motors for their electric locomotives. The Swedish builder ASEA is typical of this type of approach and it is this company's technology that Electro-Motive will use in the construction of two demonstration models for U.S. railroads. One of the demonstrators has two three-axle trucks rated at 6,000 hp; the other has three two-axle trucks rated at 10,000 hp.

Modern Railroads Vol. 29 No. 9, Sept. 1974, pp 100-104

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

04 080786
F40C PROPULSION ENGINE DRIVES "HOTEL POWER" SYSTEM
These locomotives, delivered initially to the Milwaukee Road for suburban service out of Chicago, place special emphasis on noise control and on the method for supplying alternating current for train heating, air conditioning and lighting. Unlike some other units designed for head-end power, the alternator is driven by the main propulsion engine. Details of control for this process are given.

Railway Locomotives and Cars Vol. 148 No. 5, June 1974, pp 16-17, 4 Phot.

PURCHASE FROM: XUM Repr. PC

04 081264
STUDY ON TESTING METHODS OF CARBON BRUSHES FOR ELECTRIC ROLLING-STOCKS
This report gives an account of experimental investigations of the factors influencing the commutation of carbon brushes for rolling stock and brush wear. It was established that: (1) the voltage drop in the commutator/brush is not proportional to current intensity; (2) the voltage/current characteristics of this interface depends on humidity; and (3) brush wear depends on current intensity, friction, sparks, humidity and the type of brush used. Numerous diagrams illustrate the various aspects examined in the study.

Teraoka, T Ishikawa, K *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 1, Mar. 1974, pp 46-50, 2 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikori-cho, Kokuburji, Tokyo, Japan Repr. PC

05 052595
PROGRAMME OF TESTS ON THE BRAKE RIG. DESCRIPTION OF VIENNA ARSENAL BRAKE TEST RIG AND CALIBRATION TESTS ON LINE
The report contains a technical description of the Vienna Arsenal Brake Test Rig and its associated instrumentation. The tests made on the line during the winter of 1972/73 to establish the mechanical conditions in the brake equipment and the climatic conditions near the bogies are summarised. The relationship between weather conditions (quantity of snow, temperature, humidity, etc.) and brake performance (stopping distance, etc.) is demonstrated. The tests are fully described in Appendices 1, 2 and 3.

International Union of Railways B132/RP 1/E, Apr. 1974, 26 pp, Figs., Tabs., 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

05 057867
PERFORMANCE OF COMPOSITION BRAKE SHOES OF ANTI-SNOW TYPE FOR DISK BRAKE—SOME INVESTIGATIONS BY FULL SIZE BRAKE TESTER
The composition brake shoes of anti-snow type were developed for disk brakes and their performances were investigated by the full size tester, because use of conventional composition brake shoes during snowfall often results in significant decrease of brake force. As a result, the decrements of friction coefficient with newly developed composition brake shoes under wet conditions were much less than those with conventional ones. The wear of composition brake shoes of anti-snow type was comparable to that of conventional ones. However, the wear of brake disks tended to increase in some degree. The test procedure for the anti-snow performance of brake shoes was found through these tests.

Idemura, K Sasaki, Y *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 89-91, Tabs.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

05 071820
RECIPROCATING COMPRESSORS AND VACUUM EXHAUSTERS FOR RAIL TRACTION VEHICLES
Compressors and vacuum exhausters are essential components of the brake equipment on rail vehicles. Reliability and space-saving design are the main features of the machines described in this article. These are built in various sizes, with motor drives for electric traction vehicles and mechanical drives for diesel locomotives.

Moser, R Sigg, M *Brown Boveri Review* Vol. 61 No. 2-3, Mar. 1974

ACKNOWLEDGMENT: EI (EI 74 705595)
PURCHASE FROM: ESL Repr PC, Microfilm

05 071984
INFORMING THE DRIVER OF BRAKE-PIPE FLOW AND LEAKAGE PARAMETERS
Receiving ready information on air brake performance when effecting routine test and ensuring breakaway, brake equipment faults and emergency applications made in the train is essential to the engineer. A new simple air-flow measuring device which can be mounted directly on the main reservoir supply to the brake valve is described, which provides quick identification of trouble sources.

Wickham, DJ (Westinghouse Brake and Signal Company Limited) *Rail Engineering International* Vol. 4 No. 4, May 1974

ACKNOWLEDGMENT: EI (EI 74 902335)
PURCHASE FROM: ESL Repr PC, Microfilm

05 080080
THE THYRISTOR-CONTROLLED HIGH-DUTY BRAKE OF THE DB'S NEW CLASS 151 CO'CO' LOCOMOTIVE [Die thyristorgesteuerte Hochleistungsbremse der neuen Co'Co'-Lokomotive Baureihe 151 der Deutschen Bundesbahn]
Design, arrangement and method of operation of the thyristor-controlled brake of the German Federal Railway's new Co'Co' locomotive are described. [German]

Bohm, H *Eisenbahntechnische Rundschau* Vol. 23 No. 9, Sept. 1974, pp 366-373, 10 Fig., 1 Tab.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

05 080121
RELIABILITY EVALUATION OF A BRAKE PIPE FLOW INDICATOR FOR USE WITH REMOTE CONTROL LOCOMOTIVE EQUIPMENT
The test data presented in this report show that the Type "B" Brake Pipe Flow Indicator is mechanically capable of operating one million cycles under laboratory conditions without failure or loss of sensitivity. Under prolonged exposure to high temperatures the diaphragm showed some effects of heat aging which is to be expected with molded rubber products not specifically synthesized to withstand high temperature environments. The apparatus developed for the cycling tests was realistic in terms of simulating a number of significant operating parameters of a flow meter used on locomotives in service. It appears therefore that the flow rater as used for a control function in remote-controlled locomotives is functionally adequate and no special precautions need be considered in relation to normally testing and maintaining this part.
Sponsored by the Ad Hoc Committee on Remote Controlled Locomotive Unit Power.

Association of American Railroads Research Center, (69-R-6) Proj. Rpt. R-108, Mar. 1971, 11 pp, 3 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

05 080355
LIMIT CAPABILITIES OF COMBINED BRAKING SYSTEMS [Leistungsgrenzen Kombinierter Bremssysteme]
The article deals with brake systems of high-speed trains, the main attention focussing on braking to complete stop. Assuming low axle drive masses, it is shown that safe braking from speeds up to 350 km/hr, is possible by means of different combined brake systems. In this connection, the eddy-current brake is of particular importance for attaining short stopping distances. [German]

Saumweber, E *Glasers Annalen ZEV* Vol. 98 No. 7-8, July 1974, pp 259-265, 9 Ref.

ACKNOWLEDGMENT: EI (EI 74 080397)
PURCHASE FROM: ESL Repr. PC, Microfilm

05 081274
SNCF EXPERIMENTS WITH AN EDDY CURRENT ELECTROMAGNETIC BRAKE [Experimentation par la SNCF d'un frein electromagnetique a courants de Foucault]
These experiments were carried out for the purpose of defining the values of all the parameters conditioning the efficiency of this type of braking system. Tests were on two types of block of different technical and magnetic design. Measurements were taken using two processes: (1) either at constant speeds where the holding-braking effort is balanced out by the tractive force of the locomotive; (2) or during braking to slow down where deceleration is brought about by the action of the blocks. The main results obtained in these experiments into the development of the retarding effort are shown in graph form as a function of the intensity, air gap, speeds and width of the rail head. [French]

Pouillet, P *Revue Generale des Chemins de Fer* Vol. 93 Mar. 1974, pp 169-176, 12 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 906)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

06 052531
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. STUDIES AND RESULTS OF INTERFERENCE CAUSED BY THYRISTOR LOCOMOTIVES WORKING ON 25 KV, 50 AND 60 HZ
This report covers essentially the results of the different tests carried out by the SNCF with thyristor locomoitve BB 15000 and by the MAV with two prototype thyristor locomotives types V 43 and V 42. The purpose of the SNCF tests was (a) to compare the different thyristor arrangements and (b) to determine the effect of the BB 15000 thyristor arrangement on the various types of SNCF track circuits. The object of the MAV measurements was to ascertain, in addition to the effects on track circuits, the interference currents, so as to be able to conclude, at a later date, the effects on telecommunication circuits. The report also contains the results of measurements taken with the type 181 thyristor locomotive belonging to the DB and with a thyristor locomotive belonging to the South Korean Railways (KNR).

International Union of Railways A122/RP 11/E, Oct. 1974, 38 pp, 25 Fig., 3 Ref., 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

06 052532
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. STUDY OF THE EFFECT OF INTERFERENCE ON TRACK CIRCUITS
This report contains a general equivalent circuit model valid for all track circuits and permitting analysis of the distribution of the interference produced in the different elements of the circuit model (which also constitute the different elements of the track circuit). These elements are studied from the point of view of their structure, in taking as a basis the theory of circuits and lines, as well as from the point of view of the penetration mechanism of which each of these is subjected. A list of electrical quantities of the track circuit is established, for which it is advisable to fix limits (criteria). The results of the evaluation of a questionnaire relating to track circuits are given, which permit a preliminary general idea to be gained of the types of installations which are affected by interference and those which are not. Finally, several practical measures taken so far for protecting track circuits against the harmful effects of interference are mentioned.

International Union of Railways A122/RP 9/E, Oct. 1973, 42 pp, Figs., Tabs., 2 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

06 052560
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. INVESTIGATION OF TRACTIVE UNITS EQUIPPED WITH CHOPPERS—TEST WITH SEVERAL RAILCARS ON THE 3 KV D.C. SYSTEM OF THE SNCB
This report contains the account of various measurements carried out by the SNCB with one and also with several coupled chopper-equipped railcars in service to determine the repercussions on various equipment of permanent installations. Evaluation of the tests has shown that, taking into account the conditions encountered on the system of the SNCB, the operation of chopper-equipped railcars does not give rise to unacceptable interference in signalling circuits. Furthermore, it does not appear that telephone and data transmission circuits are significantly affected by these units, in comparison with conventional units. The report also includes a theoretical study for calculating the amplitude of the most important harmonics.

International Union of Railways A122/RP 10/E, Oct. 1973, 37 pp, 21 Fig., 17 Tab., 2 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

06 052562
USE OF ELECTRONIC COMPONENTS IN SIGNALLING. NON-ELECTRICAL ENVIRONMENT IN THE CASE OF ELECTRONIC SIGNALLING SYSTEMS
The report describes the non-electrical environment which needs to be taken into account when planning railway safety installations containing electronic components. Explanations cover the following effects: air pressure variations, chemical effects, water, humidity, temperature effects, mechanical stresses, and a combination of environmental effects in relation to the four ways in which safety installations may be accommodated: closed rooms, capsulated outdoor installations, lineside equipment, tractive units and other vehicles. The tabulation of the values which are typical of the parameters of the non-electrical environment completes the report.

International Union of Railways A118/RP 4/E, Apr. 1974, 31 pp, 4 Tab., 4 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

06 052568
OPERATING PRINCIPLES ENABLING A SINGLE TRACK TO BE USED IN EITHER RUNNING DIRECTION OVER A SECTION OF DOUBLE TRACK
Over a line with double track, it may be necessary to make arrangements for trains to run temporarily in both directions over a single track, the other track being unusable due to repairs, a traffic incident, an obstacle, etc.; this happens more and more due to modern methods of maintaining the track and catenaries, which require such long periods of work that it is generally not possible to do them without transfering the running of a certain number of trains to the other track. This document sets out the measures taken by certain UIC Member Railways (SNCF, BR, CFF, DB, DSB, FS, NS, OBB, PKP, RENFE, SJ, SNCB) in order to reduce delays due to the running of trains in the wrong direction, without endangering safety of operation.

International Union of Railways 29, Jan. 1972, 12 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

06 057502
GERMANY AUTOMATES ITS RAILS
This article bites off a chunk of German Federal Railway (DB), suburban commuter lines (S-Bahnen), and urban mass-transit systems (U-Bahnen) technology that is so complex that it is difficult for the reader to understand in an article of limited length—unless it is somewhat "digested" in content. Therefore, presented here is a broad-brush overview of the railway signaling techniques, track-to-train communications, and safety systems that have evolved in the Federal Republic since the end of World War II.

Friedlander, GD *IEEE Spectrum* Vol. 11 No. 7, July 1974, pp 73-77, 5 Fig.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

06 057722
DUTCH RAILWAYS SIGNALLING MODERNISATION VISITED BY THE INSTITUTION OF RAILWAY SIGNAL ENGINEERS
Integration of computer techniques and television displays into its existing system and extending automatic train control were activities which NS lectured and demonstrated to 120 signal engineers from several countries. The decision to install a.t.c. and to adopt the GRS equipment was made in 1963. It is a continuous system in that the signal is passed continuously to the train pick-up and unless this is so, the train cannot continue to run. An a.t.c. system has been installed between Utrecht and Lutterade, a distance of 140 km.

Smith, VH Verheul, IG *Rail Engineering International* Vol. 4 No. 5, June 1974, p 205

PURCHASE FROM: ESL Repr. PC, Microfilm

06 057818
CONTROL ALLOCATION INVESTIGATION: SAMPLING RATE SELECTION
One of the major considerations facing the design of high performance automated transit systems is the efficient and economical allocation of the control functions between the transportation vehicle and a digital computer located at the wayside. The report examines the non-emergency control of vehicle speed and spacing (i.e., the vehicle regulation problem). The primary goal is to identify the type of information and the rate at

which this information must be exchanged across the vehicle/guideway interface in order to achieve precise vehicle regulation. A successful system design keeps the communication requirements within the available channel capacity. The effect of control allocation on these requirements is examined by varying the complexity of the onboard vehicle control system.

Pitts, GL
Johns Hopkins University, Silver Spring Intrm Rpt. APL-TIR-009, Apr. 1974, 89 pp

Contract DOT-UT-30010

ACKNOWLEDGMENT: NTIS (PB-233395/3)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-233395/3, DOTL NTIS

06 057861
TRAFFIC SIMULATOR DESIGNED FOR THE TEST OF ROUTE SETTING SYSTEM

A computer-controlled route setting system is part of the Centralized Traffic Control system installed on the Musashino line of the JNR. Test of the route setting had to be accomplished without disturbing the CTC system and affecting operation of trains. The authors designed a traffic simulator which employed a computer, software of which issued traffic information for system testing. The article describes the development and function of the simulator.

Sasaki, T Takaoka, H *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 85-86

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

06 057875
COMMUTER COMPUTER FOR GLASGOW

Every minute of the rush hour, one train enters and another leaves Glasgow's Central Station. If one train is delayed, it holds up several others. Next year, British Rail hopes to experiment with one of the world's first computers to reschedule trains through a junction. Simulations suggest it could halve delays at Glasgow Central.

Hanlon, J *New Scientist* Vol. 63 No. 912, Aug. 1974, pp 512-514

ACKNOWLEDGMENT: New Scientist
PURCHASE FROM: New Science Publications Limited 128 Long Acre, London WC2E 9QH, England Repr. PC

06 071773
POSSIBILITIES OF TRACTION AUTOMATION

The development of an automatic train control system, begun in 1969, on three motor coaches in the southeastern suburbs of Paris, is described. The equipment consists of the following: an imposed-speed device; a device for automatic stopping in stations; a speed limit programmer; a timetable programmer. The way of using this equipment, mounted in the driver's cab, and the conditions under which the driver can override the automatic control are explained. With an improved version of the system an accuracy of the time of arrival at a station (vs schedule) of about 6 sec was obtained, to the extent that late running from the preceding station did not exceed the possibilities of traction. Otherwise, several intervals between stations would be necessary in order to revert to the timetable. Measurements of the consumption of energy have enabled the saving in tractive power to be estimated at 15%.

Autruffe, H (French National Railways) *French Railway Techniques* Vol. 17 No. 1, 1974

ACKNOWLEDGMENT: EI (EIX740800316)
PURCHASE FROM: ESL Repr PC, Microfilm

06 071786
DESIGNING A NON-COOPERATIVE TOKENLESS (NON-TOKEN) BLOCK INSTRUMENT FOR SINGLE LINE SECTIONS

The advantages of Tokenless (Non-token) Instrument over the conventional token instruments, toward additional safety, operational convenience, reduction in operating time and consequent increase in Section Capacity are well known. This system, although it eliminates the handling time of a token from the Station Master to the driver and vice-versa, still requires some indefinite time for the simultaneous operation (cooperation) on the instrument of the two ends of the Block Section. It is possible to save this time if the operations leading to the permission to approach and closing of the block section could be permitted without any consent in action, from the Station Master at the other end. This additional flexibility can only be obtained by additional safeguards in the design. A design, however, is based on certain assumptions which may vary from place to place and also may not be valid under all conditions of working. An attempt has been made in this paper to examine individually and collectively the various aspects which are relevant to the reliable and dependable working of this type of instrument and to formulate a suitable design, keeping in view, of course, the economic considerations.

Das Gupta, P *Rail International* Vol. 5 No. 4, Apr. 1974

ACKNOWLEDGMENT: EI (EIX740802419)
PURCHASE FROM: ESL Repr PC, Microfilm

06 071809
SHIP CONGESTION AT A SCHEDULED DRAW BRIDGE

The railroad bridge at Dordrecht, Netherlands, can be raised to let big ships pass through. This takes place according to a fixed daily time schedule derived from the railway timetable. The waiting times of the ships depend on the number and duration of these openings, the headway of the unraised bridge and the traffic supply. The dependence of the waiting times on the above-mentioned factors is quantified by means of a Monte Carlo simulation procedure.

Van Daal, J (Erasmus University, Holland); Van Doeland, F *Transportation Science* Vol. 8 No. 1, Feb. 1974, pp 24-34, 6 Ref

ACKNOWLEDGMENT: EI (EIX740701606)
PURCHASE FROM: ESL Repr PC, Microfilm

06 071818
THYRISTOR CHOPPER CONTROL AND THE INTRODUCTION OF HARMONIC CURRENT INTO TRACK CIRCUITS

The presence of alternating currents in a dc traction supply owing to the action of synchronously switched power-control equipment and also due to line voltage-frequency-harmonic voltage ripple is considered. The factors that determine the magnitude and frequency of such current in the power rails, for various conditions of dc-chopper operation are discussed. Models that describe the introduction of harmonic current into track circuits are developed from power-circuit considerations, and theoretical predictions are compared with practical results. The use of multiphase chopper equipment to reduce the size of the input filter is considered. It is shown that, when normal-load unbalance conditions are considered, no advantage is gained by using more than two phases.

Lowe, TJ (Ministry of Transport, England); Mellitt, B *Institution of Electrical Engineers, Proceedings* Vol. 121 No. 4, Apr. 1974, pp 269-275, 7 Ref

ACKNOWLEDGMENT: EI (EIX740705067)
PURCHASE FROM: ESL Repr PC, Microfilm

06 071841
ATA RAIL TRANSIT CONFERENCE HELD IN SAN FRANCISCO, CALIFORNIA ON APRIL 14 AND 16, 1974. POWER AND SIGNALS SESSIONS

Three of the papers relate to power and train control systems for rail rapid transit and Pastor describes the state of the art of automatic train control systems. Engle's paper refers to the environmental problems relative to electronic equipment. The Ledsham paper relates to Thyristor Chopper train controls with regenerative power capability and the Toronto test program with this equipment. The Mombach paper discusses NYCTA study of the relative ability of four different types of subway signal cable to function during a fire and the relative toxicity of their combustion products. Mr. Kalkhof studies the cross bonding of running rails to improve the negative return path for propulsion current, and to minimize electrolysis to adjacent structures.

Prepared by Bay Area Rapid Transit District, New York City Transit Authority, Hewlett Packard, Inc., and Toronto Transit Commission.

Pastor, GJ Engle, CH Mombach, JG Ledsham, HT Kalkhof, C
American Transit Association Paper ATA/RT-74/3, Aug. 1974, 131p

ACKNOWLEDGMENT: NTIS (PB-234826/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-234826/6, DOTL NTIS

06 071961
COMPUTER-AIDED DESIGN OF NON-INSULATED TRACK CIRCUITS
For the non-insulated track circuits with loop-coupled receiver, a method is described for computer-aided determination of the optimum terminal impedances and the corresponding maximum length. The method involves provision for shunt and control operations by the track circuit, with simultaneous determination of their critical parameters. A numerical example, resolved on an IBM-360 computer, provides an illustration of the practical use of the proposed method.

Iancu, OD (Polytechnic Institute, Bucharest) *Rail International* No. 6, June 1974, pp 423-450, 18 Fig., 3 Tab., 7 Ref., Apps.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

06 071985
RE-SIGNALLING THE SCOTTISH SECTION OF THE ELECTRIFIED BR WEST-COAST MAIN LINE TO GLASGOW
Power signaling with remote controls from only two signal-center control panels and incorporating computer-based train describers, is used to monitor 90 miles of track. Power supplies for signaling are generally derived from public sources at 415 V, three-phase, four-wire. The remote control system is fully transistorized and mounted on printed circuit boards. These controls and indications are all simple two-state conditions and scanning is at the rate of 750 bit/sec.

Goldsbrough, JV *Rail Engineering International* Vol. 4 No. 4, May 1974

ACKNOWLEDGMENT: EI (EIX740902332)
PURCHASE FROM: ESL Repr PC, Microfilm

06 071987
TELECOMMUNICATION CABLE LINK OF THE SOUTH AFRICAN RAILWAYS BETWEEN JOHANNESBURG AND CAPE TOWN
The cable link running along the permanent way between Johannesburg and Cape Town was placed in service for the South African Railways. The makeup of the cables used, the mode of operation of the link, and the projection of the route are described. A brief account is also given of the importance of this Siemens-built link for the operation of the South African Railways. Besides being Africa's so far longest coaxial cable link, its technology is rated as the most advanced in the world.

Beck, K Desi, DG *Siemens Review* Vol. 41 No. 4, Apr. 1974

ACKNOWLEDGMENT: EI (EIX740901873)
PURCHASE FROM: ESL Repr PC, Microfilm

06 071992
OPTIMAL SELECTION OF THE SIGNAL FREQUENCY FOR TRACK CIRCUITS AT 16 2/3-HZ TRACTION [Optimale Wahl der Signalfrequenz fuer Gleisstromkreise bei 16 2/3-Hz-Traktion]
Circuits are considered which are used for reporting automatically whether a track section is vacant or occupied. They also serve as protective installations for modern railroad traffic. Various conditions for the selection of the signal frequency are discussed. [German]

Hofstetter, E *Association Suisse des Electriciens Bulletin* Vol. 65 No. 5, 8 Ref.

ACKNOWLEDGMENT: EI (EIX740900406)
PURCHASE FROM: ESL Repr PC, Microfilm

06 072451
AUTOMATION ENSURES SAO PAULO METRO'S LINE CAPACITY
Opening in September 1974 and designed for a throughput of 80,000 passengers per hour, the Sao Paulo metro relies on a high degree of automation. Westinghouse Electric has designed a system which separates the functions of safety, operation and central supervision, and provides corrective strategies in the event of delays or malfunctions.

Railway Gazette International Vol. 130 No. 9, Sept. 1974, pp 351-352

PURCHASE FROM: XUM Repr. PC

06 072492
SYSTEMS PARAMETERS AND THEIR AFFECT ON AUTOMATIC TRAIN CONTROL SYSTEM DEVELOPMENT
In order for an Automatic Train Control System to function within the total complex of a rapid transit system, the ATC designer must be aware of and make adjustment and allowance for the various other elements of the system which can place restrictions on the ATC design and operation. These and other system parameters take on many shapes and forms and in many cases are not as apparent as some of the parameters. Changing any of the critical systems characteristics can have far reaching effects on the total system.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Swithers, FG (De Leuw, Cather and Company)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A)
Proceeding Part 1, 1974, pp 516-519

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072493
THE ARCHITECTURE OF COMMAND AND CONTROL SYSTEMS FOR MODERN RAPID TRANSIT
Automatic Train Control comprises three subsystems: Automatic Train Protection, Automatic Train Operation and Automatic Train Supervision. ATP performs the vital safety functions. ATO controls propulsion and braking, ATS operates the transit system so it effectively provides the transportation service that is its sole reason for existence. The author noted that the rapid transit trend today is for more sophistication in the centralized control function. This control stabilizes system operation and provides dependable and expeditious service. A dollar invested in command and control can save many dollars of expenditure on rolling stock and fixed plant. There is also the potential for saving operating labor.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Freehafer, JE (General Railway Signal Company)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A)
Proceeding Part 1, 1974, pp 507-515, 9 Fig., 5 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072494
OCCUPANCY DETECTION TECHNIQUES FOR TRANSIT SYSTEMS
Occupancy detection in a transit system which does not use a pair of rails for shunting can be accomplished by a continual "check-in/check-out" process for each train as it moves about the system. With this process, each train in the system indicates track occupancy by transmitting signals to wayside antennas which extend the length of each block. Once received for a particular block, this occupancy signal sets a latched, positively reset relay or solid-state memory, which will provide an occupancy indication for that block until the train establishes occupancy in the next block. The occupancy information for each track is processed through a series of vital safety checks. These checks monitor possible emergency conditions and provide the appropriate alarms to the speed encoding subsystem and other subsystems. By using the appropriate hardware to implement these principles, this subsystem has been made failsafe. The failsafe operation of this subsystem depends upon the specific hardware component choices such as vital relays, failsafe and gate, etc., and on proper system-level design criteria. In addition, this type of logic can be used in a system which does employ shunting of the rails for occupancy detection in order to provide redundancy for increasing the margin of safety.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Barpal, IR (Westinghouse Electric Corporation)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A)
Proceeding Part 1, 1974, pp 319-322, 1 Fig.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072559
SAFETY AND AUTOMATIC TRAIN CONTROL FOR RAIL RAPID TRANSIT SYSTEMS
The anticipated construction and expansion of rail rapid transit systems in the United States over the next 10-15 years implies major capital expenditures. A significant level of automation in train control is likely to be central to these systems. The potential safety problems associated with various implementation alternatives, several possible levels of automation, and uncertainty in the corresponding proper role of the human operator raise issues requiring timely resolution. This report describes the state-of-the-art in rail rapid transit system automatic train control, assesses the safety related interrelations between the train control system, functions of the human operator and other portions of the total system, and makes recommendations, based on current experience, to aid the process of planning, funding approval, design, implementation, test, safety certification and operation of new systems or modifications of existing systems. The Study suggests that the Federal Government develop safety criteria by which to evaluate future proposals and establish guidelines for safety certification procedures. It also concludes that knowledgeable application of system engineering skills and advanced development program techniques together as a process, are probably more important to achieving a successful new rail rapid transit system than are individual design decisions or application of advanced technology.

Pawlak, RJ Colella, AM Knable, N Robichaud, RH Sussman, ED Transportation Systems Center, (OE404-R4602) Final Rpt. DOT-TSC-OST-74-4, July 1974, 278 pp

ACKNOWLEDGMENT: TSC
PURCHASE FROM: NTIS Repr. PC

PB-235/492/6 st, DOTL NTIS

06 072660
AUTOMATION AND CONTROL IN TRANSPORT
This book provides a highly technical, sophisticated engineering treatment of transport control systems, with considerable attention to railroad signaling and control systems. The book also covers interlocking and classification yards. Automatic Train Control and locomotive control systems are also covered, as are braking systems and guidance systems. The book also covers highway control systems and advanced systems such as air cushion vehicles and the linear induction motor. Numerous references to other works are given.

Barwell, FT (Swansea University College, England)
Pergamon Press 257 pp, Figs., Phots., Refs.

PURCHASE FROM: Pergamon Press, Incorporated Maxwell House, Fairview Park, Elmsford, New York, 10523 Repr. PC

06 072678
A SURVEY OF RAILWAY SIGNALING AND CONTROL
Railway signaling originated from the basic needs of safety, but its development has permitted the exploitation of wider facilities, in the form of considerable economics and increased efficiency, coupled with the attainment of higher speeds and improved control. It is closely supported by telecommunications techniques, both in ancillary functions and in characteristic railway communication networks, using land and radio transmission media. Signaling is based on the principle of "fail-safe" and complete reliability; at first it was effected by mechanical means, but subsequently supported and replaced by electrical means, the latter method proving itself by means of specialized application and method, to be the most suitable for the very exacting performance demanded. The introduction and improvement of electronics is now playing an increasing part in the operation of railways, and holds much promise for greater application in the future, having under its wing not only control and peripheral installations as they are known today, but also new capabilities in the form of revenue collection, data handling, and streamlined administration. The recent trend is toward automation, to which railway systems are particularly adaptable, but there are still many unsolved problems. In signaling and communications, managements have not only the best possible insurance policy, but an indispensable tool for commercial viability; these two assets will play a large and vital role in the imminent transport explosion of the future.

Cunliffe, JP (Harris (Frederic R), Incorporated) *Institute of Electrical and Electronics Engrs Proc* Vol. 56 No. 4, Apr. 1968, pp 653-674, 10 Fig., 11 Ref.

ACKNOWLEDGMENT: Institute of Electrical and Electronics Engrs Proc
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072704
AUTOMATIC ROUTE SETTING BY THE TRAINS. INSTALLATION AT PARIS-AUSTERLITZ, IN FRANCE [La commande automatique des itineraires par les trains-indexation active. Application a Paris-Austerlitz]
The authors describe the equipment installed in the Paris-Austerlitz central box which enables routes to be set automatically by the trains without the intervention of a controller at a fixed position or a signalman pressing a route button; only the close association of two basic operations is necessary: automatic identification of trains, automatic control of the routes. [French]

Marchand, R Chedeville, B *Revue Generale des Chemins de Fer* Vol. 93 June 1974, pp 337-347

ACKNOWLEDGMENT: EI (EI 74 065241)
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072862
METHODS OF LOCATING "HOT BOXES" ON THE DB [Ausbau der Heisslauferortung bei der deutschen Bundesbahn]
The Author briefly reviews the equipment used on the DB for locating "hot boxes", discusses success so far achieved and reports on the new procedure. The newer equipment can distinguish between "warm boxes" and "hot boxes", and thus facilitates corrective action. [German]

Meyer, HJ *Eisenbahntechnische Rundschau* Vol. 23 No. 10, Oct. 1974, pp 411-416, 5 Fig., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

06 072865
THE NEW SYSTEM SOLUTION FOR OPERATIONG [Die neue Systemlosung fuer Betriebssteuerzentralen]
The new system presupposes a step-by-step but never total automation of railway working. It allows adaptation to different forms of interlocking systems and is preplanned on the assumption of several extension stages. Co-operation between the region and the central control is explained in detail; particular reference is made to the fulfilling of security conditions. [German]

Delpy, A *Eisenbahntechnische Rundschau* Vol. 23 No. 10, Oct. 1974, pp 387-395, 5 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

06 072966
ONE RADIO CHANNEL CAN CONTROL MANY VEHICLES
The author shows the manner in which the development of the binary system and the corresponding coding enables the points, and locomotives, or other vehicles, to be remote controlled by means of one radio channel. He describes the layout and operation of such a control, whose transmitting equipment is situated at a fixed or movable point, and the receiving equipment on a vehicle.

Shook, CG *Railway Signaling and Communications* Nov. 1963, pp 26-40, 6 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072967
CONTROL ALGORITHMS FOR RAIL RETARDERS AND CLOSING UP DEVICES IN MARSHALLING YARDS
Making use of all the research carried out, up to the present, into the automation of marshalling yards, the author sets out to define the arrangements ensuring their automatic operating without any accident or human intervention. He considers the problem of automatic route formation in accordance with a programme to have been already resolved, and recapitulates the studies already carried out concerning the space-time function of the movement of wagons, as well as the parameters on which that function depends—the running of the wagons, curves, points and crossings, air resistance, the uncertain differences in speed when leaving the retarder and in the composition of the cuts, and the authorised speeds of

impact. He then describes and discusses some of the solutions which have been proposed, or tested, in order to resolve the problem, and finally arrives at the system which he referes to as the 2-Delt V method. He examines it at length, and gives a detailed explanation of the Siemens algorithm of the operation of a variation of this method, providing for primary and secondary retarders, and ASEA spiral retarders. Finally, he deals with another variation, providing for a haulage truck at the exit from the secondary retarders, and he shows the algorithm. The article contains the plans of two marshalling yards equipped with these systems, together with a brief description, in an appendix, of the Dowty system used in the English station of Tinsley.

Koenig, H *International Railway Congress Assn Monthly Bull* Vol. 6 No. 12, 1969, pp 477-524, 33 Fig., 4 Tab., 16 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072969
HOW TO CONTROL HUMP LOCOMOTIVES
After having drawn attention to the advantages of the control of the speed of the above locomotives, particularly from the point of view of rapid marshalling, the author describes the equipment and method of operation of a number

Stipancic, C *Railway Signaling and Communications* Aug. 1969, pp 26-28, 2 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072973
THE REMOTE CONTROL OF OPERATIONS IN AN AUTOMATED MARSHALLING YARD AS AN INTEGRAL PART OF A CYBERNETICS SYSTEM
After an introduction devoted to general observations concerning the application of cybernetics on the railways, and the purposes for which they are used in an automated marshalling yard, the author examines the working conditions and technical means employed in marshalling operations, in order to regulate the backing speed and approach speed to the hump and prepare sorting routes in the sidings, as well as the programme covering running control. The system of Siemens A.G., and the Federal Railway's Central Office in Munich, and an order has been placed for a prototype installation, which will be installed in the Seelze marshalling yard.

Delpy, A *International Railway Congress Assn Monthly Bull* No. 3, 1969, pp 109-132, 21 Fig., 19 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072974
EQUIPMENT FOR THE AUTOMATION OF KORIYAMA MARSHALLING YARD
A new automation system called the YAC (yard automatic control) which can handle 4,300 freight cars daily was put into operation in the Koriyama yard last September. The equipment described in this article includes retarders, radar speedometer, fullness measuring apparatus, axle detector, car stopper, and the Herringbone tracks.

Daikoji, H *Japanese Railway Engineering* Vol. 9 No. 3, 1968, pp 12-15, 7 Fig., 4 Phot.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072975
DT&I INSTALLS ACI AT CLASSIFICATION YARD
The above article concerns the modernisation of the Detroit Marshalling Yard which now deals with some 1,700 wagons per day. 4 Kar Trak detectors, a computer, and 3 teleprinters, have been installed there, to enable the marshalling yard to be better controlled. A detailed description is given in the article of the whole installation, as well as of its operation, hump-shunting control, etc.

Railway Signaling and Communications 1968, pp 15-19, 6 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072979
DEVELOPMENT OF REMOTE SYSTEM FOR SHUNTING LOCOMOTIVE IN JAPAN
After having made reference to the advantages of the remote control of shunting locomotives, particularly in marshalling yards, the author describes the characteristics of the two successive prototypes designed for the remote control of these locomotives, employed in the Koriyama yard in Japan.

Nakamura, I *Japanese Railway Engineering* Vol. 9 No. 1, Mar. 1968, pp 18-20, 3 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072980
SP: HAS PROCESS CONTROL IN RETARDER YARD
A description of the control equipment used in the Englewood marshalling yard, in Houston, Texas: employment of computers for the continuous control of the shunting of wagons and of the operation of the retarders.

McWhirter, RG *Railway Signaling and Communications* May 1968, pp 24-26

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 072982
HOW A DIGITAL COMPUTER CONTROLS A CLASS YARD
A detailed description of the successive operations carried out in a marshalling yard, between the time of arrival of a train and the departure of a train formed of wagons marshalled on the sorting sidings. An explanation is given of the role of the electronic computer, which assembles and stores all the data, as and when the marshalling operations proceed, and transmits the necessary instructions in turn to the different sections of the marshalling yard.

George, F *Railway Signaling and Communications* Jan. 1968, pp 24-31, 9 Fig., 1 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

06 080089
BASIC STUDY ON COMTRAC SYSTEM FOR OKAYAMA EXTENSION OF SHIN KANSEN
COMTRAC is a system aimed at a comprehensive operation control of Shin-Kansen. Auomation mainly intended for control of train route was introduced on Shin-Kansen when control of train route was introduced on Shin-Kansen when dispatching still remains in the experimental stage. With farther extension of Shin-Kansen to Hakata, an enlarged and revised system with added functions of train dispatching through man-computer dialogue with CRT graphic display, automatic transmission of dispatching data and automatic assignment of cars will be introduced and the related construction is now under way. The paper purports to describe the basic design conceptions behind the system for route control and train dispatching introduced with extension to Okayama and the basic designing of a computerized system embodying these conceptions.

Yamamoto, I Kawamura, T Okumura, I Hasegawa, Y *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 144-155, 12 Fig., 3 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

06 080090
BIT ERROR RATE AND CROSSTALK DISTURBANCE IN TRANSMISSION OF BASEBAND SIGNAL CODES
First, a structure of occurring error codes caused by pulsive noises in transmission of baseband signal codes is analyzed theoretically, and then confirmed by experiments using various noise patterns, as regard several parameters affecting the error rates. Examples of the rates measured in J.N.R.'s lines are shown, and a predicting method for the rates as well as application to practical lines are illustrated. Next, as for crosstalk disturbances, formulae derived analytically from the step response function of the line are presented, expressing spectra of the crosstalk wave. Applying

this to comparatively short lines, the disturbances in lines practically used, such as low speed telegraph and the C.T.C. system's 2400 bauds are evaluated, and for the future, sending power levels of high speed lines are discussed relating with the error rates.

Takahashi, K *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 137-143, 8 Fig., 2 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

06 080254
DETECTION OF TRACK GUIDED GROUND VEHICLES USING THE TRACK AS AN ELECTROMAGNETIC SURFACE WAVEGUIDE
The importance of vehicle detection and communication in mass transportation systems is discussed along with the advantages of track guided systems and the use of automation. Present and proposed methods of tracked vehicle detection are reviewed. An innovative method is proposed for detecting or communicating with tracked vehicles in which the track is used as an open waveguide. The characteristics of a rail as a communication channel are determined and suggestions for analyzing other parts of the system are discussed. A method of analyzing wavelengths of arbitrary shape and consisting of glossy materials was required. The problem of distinguishing the desired modes from non-physical spurious and other modes is discussed and the complete set of programs is listed and described. History, definitions, and applications of electromagnetic surface waves are reviewed and behavior of two types of surface waves are presented.

McAulay, AD
Carnegie-Mellon University, Urban Mass Transportation Administration, (UMTA-PA-11-007) PRI-74-103, Dec. 1973, 193 pp

ACKNOWLEDGMENT: NTIS (PB-235727/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235727/5, DOTL NTIS

06 080307
CONTROL OF PAIRING OF VEHICLES ON A PUBLIC TRANSPORTATION ROUTE, TWO VEHICLES, ONE CONTROL POINT
If the time required for a vehicle (particularly buses or elevators) to load passengers is an increasing function of the number of passengers loaded, then, on a route served by more than one vehicle, the vehicles tend to form pairs. If a vehicle runs behind (ahead of) schedule, it typically will pick up more (less) passengers and get even further behind (ahead of) schedule. The following is concerned with a shuttle type of route having just two vehicles and serving passengers who arrive at a constant rate. There is one control point at which vehicles can be intentionally delayed. The object is to devise a strategy of control that will minimize the average waiting time of the passengers. The strategy must correct for random fluctuations in trip time so that the headways will not become sufficiently unequal as to initiate effects of pairing. An approximate solution of the optimization problem suggests that the optimal control involves sufficiently tight control that the pairing effect has little influence on the waiting times.

Newell, GF (California University, Berkeley) *Transportation Science* Vol. 8 No. 3, Aug. 1974, pp 248-264, 7 Ref.

ACKNOWLEDGMENT: Transportation Science
PURCHASE FROM: ESL Repr. PC, Microfilm

06 080314
ADVANCE TO AUTOMATION
This editorial initially spells out the features of railroads which make them a natural for automation and addresses the question of whether automation should be such a major concern of railway administrations. Examined are four possible areas of automation: (1) Automatic operation of the trains themselves; (2) Automatic operation of the signalling systems; (3) Automatic operation of the passenger fare collection process; (4) Automatic operation of a maximum amount of auxiliary equipment. Each of these facets of the problem is analyzed in terms of London Transport experience. The author's conclusion: "Automation is essential."

Way, R *Rail International* No. 11, Nov. 1974, pp 687-697

PURCHASE FROM: ESL Repr. PC, Microfilm

06 080343
ASSOCIATION OF AMERICAN RAILROADS, COMMUNICATIONS AND SIGNAL SECTION, 14TH ANNUAL MEETING, ADVANCE REPORTS, 1974
The Advance Reports represents in condensed form a portion of the efforts of the members and officers of the various committees for 1974. The reports included in the book represent only a portion of the total work performed during the year, as many of the assignments are continuous.

Presented at the AAR, 14th Annual Meeting, Communications and Signals Section, Atlanta, Ga., September 16-18, 1974.

Association of American Railroads Sept. 1974, 306 pp

ACKNOWLEDGMENT: EI (EI 74 080398)
PURCHASE FROM: AAR Repr. PC

06 080350
RADIO COMMUNICATIONS EQUIPMENT FOR THE SOCIETE DES CHEMINS DE FER VICNAUS DU ZAIRE (CVZ)
The radio communications system for the new railway line between Akeli and Bumba of the Chemins de fer Vicinaux du Zaire commenced operation in December 1972. The backbone of the installation is a 400 MHz directional radio link. The control center is at Aketi, from which every station and locomotive on the 185 km long railway line can be reached. The radio communications system eliminates complex signal equipment and ensures reliable train services.

Hefti, E *Brown Boveri Review* Vol. 61 No. 6, June 1974, pp 279-281

ACKNOWLEDGMENT: EI (EI 74 080399)
PURCHASE FROM: ESL Repr. PC, Microfilm

06 081262
WANTED: NEW STANDARDS FOR AFO
Paper presented by the author, senior research engineer for the General Railway Signal Co., at the 1974 annual meeting of the AAR Telecommunications and Signalling Dept. It deals overall with the problems of audio-frequency track circuits: (1) track impedance in relation to frequency; (2) voltage drop at the end of the circuit, in relation to circuit length and different frequencies; (3) effect of ballast resistance and safety margins for system operating depending on variations in ballast resistance; (4) pre-shunt and extended shunt phenomena; and (5) choice of the feed and receive end impedances of transmitters and receivers and of the figurative impedance of shunting by a vehicle. The author comments on the diagrams illustrating these phenomenae and draws conclusions as to the beneficial or harmful effects resulting from modifications of: (1) the impedance of the equipment used; (2) the frequency used; and (3) the energy level of the signal transmitted or the receiver gain.

This publication, Rail Engineering International, 13 also available from Broadfields (Technical Publishers) Limited Little Leights, Chelmsford, Essex CM3 1PF, England.

Freilinghaus, K *Rail Engineering International* Vol. 4 No. 4, May 1974, pp 182-188, 12 Fig.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1154)
PURCHASE FROM: ESL Repr. PC, Microfilm

06 081271
PROPOSAL CONCERNING AN ALL-PURPOSE BLOCK SYSTEM INSTALLATION FOR DOUBLE TRACK LINES [Vorschlag fuer eine universelle Streckenblockausstattung zweigleisiger Eisenbahnstrecken]
While work is being carried out on the track, catenaries, etc. of double track lines, trains still go through in both directions on one track only. In general, the corresponding safety installations are lacking and when operating trains in both directions technical running safety has to be forfeited. In this article the possibilities that exist for overcoming these drawbacks by means of a modern safety technique are studied. A block system installation for double track lines is twice suggested as an all-purpose solution. The advantages offered by such a system are described. [German]

Uhlig, J *Signal und Schiene* Vol. 18 No. 4, 1974, pp 125-128, 2 Fig., 7 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 901)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

06 081379
COMTRAC FOR TOKYO-HAKATA SHINKANSEN
To control the expanded and more diversified train services associated with extension of the Shin Kansen network, Japanese National Railways has introduced a more sophisticated control system, COMTRAC, by which the dispatcher can accurately and effectively regulate train traffic by fully utilizing computers. COMTRAC will be successively expanded through four stages. COMTRAC will control scheduling and route control, then will incorporate traffic adjustment functions and finally will involve transmission of instructions, delay information and automatic information to passenger stations. Two kinds of computers are used separately for the traffic controls system and the route control system.

Sato, M Hideyama, M (Japanese National Railways) *Japanese Railway Engineering* Vol. 15 No. 1, 1974, pp 19-22, 7 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

06 081389
MATCHING MODERN SIGNALLING TO TRAFFIC REQUIREMENTS
Improvement of signalling and telecommunications has come to be recognized by management as one of the most effective ways of reducing operating costs and increasing capacity. It is important to select a level of equipment modernization which is suitable for the traffic flow envisaged, otherwise resources will be wasted and maintenance costs will be unnecessarily high. True economy, however, demands detailed consideration of equipment reliability and safety before a choice is made.

Yoshimura, H *Developing Railways* 1975, 4 pp, 2 Fig., 4 Phot.

ACKNOWLEDGMENT: Developing Railways
PURCHASE FROM: XUM Repr. PC

07 057648
ALCOHOL, DRUGS, AND DRIVING
The basic purpose of the Vermont Symposium was publication of the proceedings to incorporate the following specific aims: (1) Systematic, evaluative reviews of the eight major aspects of alcohol and drug problems related to highway safety, with each review written by a leading specialist in that aspect; (2) a synthesis of the edited transcriptions of the discussion periods that followed presentation of the summaries of each of the eight review papers; and (3) ratings of 176 key-word topics on three dimensions of alcohol, drug, and driving problems, i.e., the extent of present knowledge, the relative priorities for basic research in terms of informational yield, and the relative priorities for applied research in highway safety. The critical reviews consist of combinations of the following topics: Alcohol and/or drug influences upon driving-related behavior as studied in laboratory, simulator, and closed-course driving experiments; epidemiologic studies of the role of alcohol and/or drugs in highway crashes and citations; and research on countermeasures for alcohol and/or drug involved problems on the highway.

Perrine, MW
Psychological Research Foundation of Vermont, Inc Final Rpt. Mar. 1974, 394 pp

Contract DOT-HS-265-2-489

ACKNOWLEDGMENT: NTIS (PB-232111/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232111/5, DOTL NTIS

07 071796
PROJECTION OF INDUSTRIAL RELATIONS CONFLICTS IN THE DOMESTIC RAILROAD INDUSTRY
An examination is presented of significant changes in the domestic labor force of the railroad industry. Statistical forecasts and substantial public policy recommendations are made based on these forecasts. Rail-labor management strife is forecast to increase unless the Railway Labor Act is materially changed or eliminated.
Twenty Fifth Annual Conference and Convention Proceedings.

Davis, GM Sullenberger, A
American Institute of Indus Engrs Conf (25th) Proceeding May 1974, 4 Ref

ACKNOWLEDGMENT: EI (EI 74 804464)
PURCHASE FROM: ESL Repr PC, Microfilm

07 072548
A DYNAMIC MODEL OF TRAVEL MODE SWITCHING BEHAVIOUR
An analogy is developed between individual traveler mode choice decisions and time-dependent product adoption processes in consumer behaviour. The structure of the adoption sequence is first described conceptually with reference to mode switching; this structure is then used to develop a simple mathematical model of mode switching behaviour over time. Factors to be considered in interpreting and operationalizing the model are then discussed at some length. The model appears too complex for direct mathematical solution except in the simplest cases; it may however, be amenable to numerical estimation, given empirical data on mode switching behaviour over time.

Hartgen, DT (New York State Department of Transportation)
Transportation Vol. 3 No. 1, Apr. 1974, pp 45-58, 4 Fig., 11 Ref.

ACKNOWLEDGMENT: Transportation
PURCHASE FROM: Elsevier Scientific Publishing Company P.O. Box 211, Amsterdam, Netherlands Repr. PC

07 072549
PSYCHOLOGICAL THEORY APPLIED TO MODE CHOICE PREDICTION
In an effort to improve transit ridership prediction, this manuscript proposes a conceptually unique mode choice model derived from the field of experimental psychology. The "psychophysical" model, as it is called, differs from earlier modal split models in its substantive use of psychological theory. The result is a modal split model with a sound behavioural foundation. The psychophysical model is tested using data from the recent demonstration of dial-a-bus in Columbia, Maryland and found to be a marginal predictor of modal split. It is noted though that the difference between actual and predicted ridership may be accounted for in a second generation model. This will employ individual rather than aggregate data, incorporate the concept of adaptation-level, and refine the decision-making process.

Ewing, RH (Harvard University) *Transportation* Vol. 2 No. 4, Dec. 1973, pp 391-409, 3 Fig., 1 Tab., 32 Ref.

ACKNOWLEDGMENT: Transportation
PURCHASE FROM: Elsevier Scientific Publishing Company P.O. Box 211, Amsterdam, Netherlands Repr. PC

07 072550
BEHAVIORAL ANALYSIS AND TRANSPORTATION PLANNING: INPUTS TO TRANSIT PLANNING
The purpose of this paper is to discuss various types of behavioral data of potential relevance to transit planning. In particular a distinction is drawn between behavioral information regarding feelings, attitudes, opinions, and the like and more sophisticated types of data dealing with individuals' intentions to respond in certain ways given certain configurations of stimuli (transportation variables). The former is shown to be an important input to incremental planning, i.e., where information as to system performance is desired. The latter is shown to be critical to decisions regarding manipulations of transit system parameters, i.e., where knowledge of the outcome of manipulating system parameters is desired. A methodological example as to how the first type of data—informational level data—can be collected and utilized in system planning is presented. Specifically, data collected along the lines of traditional attitude surveys is collected in an attempt to monitor changes in public "satisfaction" with the Iowa City, Iowa, bus system before and after major system innovations. Implications of the collection and analytical procedures are discussed.

Horton, FE (Iowa University, Iowa City) *Transportation* Vol. 3 No. 2, July 1974, pp 165-181, 5 Tab., 8 Ref.

ACKNOWLEDGMENT: Transportation
PURCHASE FROM: Elsevier Scientific Publishing Company P.O. Box 211, Amsterdam, Netherlands Repr. PC

07 072859
HUMAN FACTORS IN SIGNALLING SYSTEMS: APPLICATIONS TO RAILWAY SIGNALLING
The author has made an in-depth study of the human factors involved in the design, construction and interpretation of signalling systems, and in particular analysis of errors, including controlled experimentation, the results being published in this book. The book belongs in the field of human factors engineering and applied and experimental psychology and will interest the signal engineer and others involved in rail safety, particularly in the design and application of the more complex systems.

Mashour, M
Wiley (John) and Sons, Incorporated Vol. 42 p

ACKNOWLEDGMENT: Modern Railroads
PURCHASE FROM: Wiley (John) and Sons, Incorporated 605 Third Avenue, New York, New York, 10016 Repr. PC

07 081254
INFLUENCE OF AGE ON THE FREQUENCY OF PHYSICAL FAILURE OF STAFF EMPLOYED ON DB TRACTIVE STOCK
[Uber den Einfluss des Lebensalters auf die Haufigkeit von Fehlleistungen beim Triebfahrzeugpersonal der DB]
Recordings were made of 2,217 automatic brake applications in cases where the vigilance button for the distant signal in the warning position was not activated, and studies were carried out on the average frequency of release of the automatic acoustic warning signal (SIFA: Sicherheitsfahrschaltung) on 10 powered units during 1,424 running days. There was found to be no relationship between age and an increase in the frequency of human lapses. The maximum values reached show fluctuations of a certain importance at all age levels. Anticipated retirements could represent a selective effect; account is also taken, unofficially, of the age of drivers of powered units on drawing up the rosters.

Hildebrandt, G *International Archives of Occupational Health* Vol. 32 No. 1-2, 1974, pp 33-41, 2 Fig., 27 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1102)
PURCHASE FROM: Springer Verlag 175 Fifth Avenue, New York, New York, 10010 Repr. PC

08 057349
A FORTRAN PROGRAM FOR GRADE CROSSING COLLISIONS STUDIES USING COMPUTER GRAPHICS
A computer program is presented in the FORTRAN language to simulate the co-planar dynamic response of vehicles to the collision situation in which a rail vehicle impacts a highway vehicle at a grade crossing. The simulation incorporates 28 individual parameters associated with vehicle geometry, initial conditions, and other variables describing vehicle structural characteristics and a point-mass occupant situated inside the struck vehicle. A complete listing of the program is given along with descriptions of the program logic, sample input and output. Inputs include the mass, velocity, and force-deflection properties of each vehicle. The displacements and rotations of the vehicles are calculated as well as the penetration of the highway vehicle and the accelerations of its occupant compartment. As a special feature, this program is capable of producing computer generated diagramatic aerial-view movies of the collision event representing a locomotive striking a sedan broadside. (Author)

Taylor, J Spencer, P
Control Systems Research, Incorporated Final Rpt. CSR-351-001-01, July 1973, 146p

ACKNOWLEDGMENT: NTIS (PB-232368/1)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-232368/1, DOTL NTIS

08 057537
EVALUATION OF SAFETY IMPROVEMENTS AT HIGHWAY-RAILWAY GRADE CROSSINGS
In recognition that added effort must be placed on reducing the conflict at highway-railroad grade crossings, this research to evaluate means of supplying motorists with more credible and forceful information was developed. Many innovative active protection devices for grade crossings have been tried or proposed. Many such devices are reviewed with evaluations of their effectiveness, if any were available. The "Monon green light" signal, several of which are in Indiana, was field observed for effectiveness and recommendations are made for improvements. A study of speed profiles of vehicles approaching a crossing protected by a standard flashing light system is also reported. A photographic data collection system was developed which allowed determination of vehicle speed profiles, thus indicating driver reaction to the crossing condition. Speed profiles for non-actuated and actuated signal conditions are analyzed. It was determined that drivers approaching the crossing under progressively greater stimulus relative to an approaching train entered the approach at correspondingly slower speeds.

Conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

Butcher, TA
Purdue & Indiana State Highway Comm JHRP Intrm Rpt. JHRP-1-73, Feb. 1973, 138 pp, 27 Fig., 22 Tab., 61 Ref.

Contract HPR-1(10)Part 2

ACKNOWLEDGMENT: Purdue & Indiana State Highway Comm JHRP
PURCHASE FROM: Purdue & Indiana State Highway Comm JHRP Civil Engineering Building, Purdue University, West Layafette, Indiana, 47907 Repr. PC

08 071781
CASE FOR THE WALKOUT CANTILEVER
Developments in the use of cantilevers for railroad crossing protection are outlined. The criteria discussed led to single plane cantilever design that is available in essentially six sizes ranging from an 8 ft. to 40 ft arm length. The extendible tip can be bolted or welded in place. The single mast design is carried to 31 ft. arm length; above that to 40 ft. arm length, double masts are required. Beyond 40 ft., the use of a box truss design is recommended.

Railway System Controls Vol. 5 No. 5, May 1974

ACKNOWLEDGMENT: EI (EI 74 0802812)
PURCHASE FROM: ESL Repr. PC, Microfilm

08 072758
RECOMMENDED PRACTICES FOR RAILROAD-HIGHWAY GRADE CROSSING WARNING SYSTEMS
The recommended practices contained in this bulletin are composite evaluations from sources in the railroad industry, Federal and state governments and manufacturers of grade crossing warning devices. These recommendations are intended to serve as guide lines only and are not to be taken or interpreted as absolute standards to be followed in all circumstances.

Approved as an American National Standard by the American National Standards Institute.

Association of American Railroads Bulletin No. 7, 1974, 30 pp, 20 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: AAR Repr. PC

08 072774
RECOMMENDED PRACTICES FOR GRADE CROSSING WARNING SYSTEMS
Technological changes in available materials and methods used in development of warning devices and systems, as well as changes in highway concepts presented in the AAR's "Recommended Practices", Bulletin No. 7 are reviewed.

Railway System Controls Vol. 5 No. 8, Sept. 1974, pp 55-56

ACKNOWLEDGMENT: EI (EI 74 072834)
PURCHASE FROM: ESL Repr. PC, Microfilm

08 081949
HIGHWAY ACCIDENT REPORT—AUTOMOBILE INTRUSION ONTO THE LONG ISLAND RAILROAD ELECTRIFIED TRACKS, AND FIRE, GARDEN CITY, NEW YORK, AUGUST 8, 1973
At 4:30 p.m., e.d.s.t., on August 8, 1973, an automobile carrying five teenagers was driven onto the electrified tracks of the Long Island Railroad by an unlicensed 15-year-old girl. The car's contact with the third rail caused a momentary short circuit and initiated severe electrical arcing. The car immediately began to burn at the front, and the fire spread to the rear. The two girls in the front seats escaped through the right door. The three girls in the back seat died in the fire. The National Transportation Safety Board determines that the cause of this accident was the driving of the automobile by an unlicensed and untrained juvenile of the roadway onto electrified tracks, where it crashed into the third rail.

National Transportation Safety Board NTSB-HAR-74-3, Sept. 1974, 33 pp

ACKNOWLEDGMENT: NTIS (PB-236267/1SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236267/1SL, DOTL NTIS

09 052528
PROTECTION OF MATERIALS. TECHNICAL SPECIFICATION FOR THE SURFACE PREPARATION OF METAL AND NON-METAL MATERIALS AND STRUCTURES FOR VEHICLES AND CONTAINERS
This report contains the requirements to be met in the preparation of the surfaces of metal and non-metal materials, components and sub-assemblies for vehicles and containers, and also for fully assembled structures. Particular reference is made to the surface preparation of steel, high-grade steel (stainless steel), light-metal alloys, timbers, synthetic materials and components and accessories coated with anti-corrosive priming paint. This report represents the revision of UIC leaflet 842-8.

International Union of Railways E17/RP 35/E, Oct. 1973, 18 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

09 052593
PROTECTION OF MATERIALS. PROCEDURES FOR TESTING PAINTS AND FILLERS
The report contains a number of procedures for testing paints and fillers. Relevant ISO documents are referred to and specified, if necessary. It is recommended that ISO norms be applied to settle scientific questions, to analyse and check new paints and paint systems, and also to test the products of new suppliers of paint. The test procedures described are intended for application to the cases of day-to-day practice which require paints to be tested quickly and with adequate accuracy. ISO norms should, on principle, be applied to matters in dispute between supplier and purchaser.

International Union of Railways E17/RP 39/E, Apr. 1974, 61 pp, 6 Fig.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

09 052594
PROTECTION OF MATERIALS. SPECIFICATIONS FOR THE SUPPLY OF PAINTS FOR THE PROTECTION OF RAILWAY VEHICLES AND CONTAINERS
The report describes the properties which are required of paints for the protection of railway vehicles and containers, i.e. the properties of such paints in the condition ready for delivery and in the ready mixed condition, and also those of the dry film. Moreover, the report contains the conditions governing supply and storage. This report is a revised version of UIC Leaflets 842-3 and 842-12.

International Union of Railways E17/RP 40/E, Apr. 1974, 10 pp, 4 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

09 057417
ADVANCED TECHNOLOGY IN THE DESIGN OF RAILROAD ROLLING STOCK [Tecnologie di avanguardia nella costruzione del materiale ferroviario]
Requirements which modern railroad cars have to satisfy are listed and their consequences for their structural design and the materials used are discussed. Application of advanced technology, in particular the use of light alloys, stainless steel, plastics, adhesives, etc., for railroad car construction is surveyed. Examples of realization for the Circumvesuviana Railroad and for the Milan and Rome subways are presented. [Italian]

Martinelli, M (Breda Construzioni Ferroviario, Italy); Ricco, N *Ingegneria Ferroviaria* Vol. 28 No. 10, Oct. 1973

ACKNOWLEDGMENT: EI (EIX740604260)
PURCHASE FROM: ESL Repr PC, Microfilm

09 057439
FERRO-CARBON ALLOYS AND THEIR USE ON THE RAILROADS [Le leghe ferro-carbonio ed il loro impiego nelle ferrovie]
An examination is made of ferrocarbon alloys, which represent at least 90% of the metallic material used on the railway. Their micro-structural characteristics are examined, and from these are obtained, for the various materials, the more typical mechanical properties and fields of utilization, with particular reference to the railway field. With numerous (25) micro and macrographs, a detailed illustration is given of the effect of treatment on steel at 0.2% carbon. In 4 tables are reproduced data on production mostly for 1972, of various metallic materials, with particular reference to steel, the data on which also refer to the modes of production and to the particular forms in which the product is marketed. [Italian]

Biggiero, G Cristiani, R *Ingegneria Ferroviaria* Vol. 29 No. 1, Jan. 1974

ACKNOWLEDGMENT: EI (EIX740605343)
PURCHASE FROM: ESL Repr PC, Microfilm

09 057863
EFFECT OF LOW TEMPERATURE TEMPERING CONDITIONS ON STRENGTH AND TOUGHNESS OF HARDENED HIGH CARBON STEELS
The effect of low temperature tempering conditions on strength, yield stress, plasticity and toughness of hardened carbon steels and low alloy steels was investigated in relation to microstructural changes. From the viewpoint of hardness as well as strength and toughness of most hardened high carbon steels, it is ascertained that optimum tempering temperature range is from 180 deg C to 200 deg C, and optimum tempering time range is from 10 hr to 15 hr at 180 deg C or from 2 hr to 3 hr at 200 deg C. And when this condition is exceeded, so-called low temperature tempering embrittlement may be caused, which is supposed to be in a close relationship with microstructural changes such as decomposition of austenite to bainite or precipitation of cementite. Besides, it is also ascertained that martempering markedly improves strength and toughness of hardened high carbon steels.

Iijima, K *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 111-117

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

09 071757
EFFICIENT PULSE SHAPES TO PLASTICALLY DEFORM BEAMS
The transient motion of a simply supported, rigid-plastic beam in response to uniformly distributed pressure pulses of arbitrary shape is considered. The objective is to determine the pulse shape that will maximize the residual deflection at the center of the beam subject to certain load constraints. Results for two constraints are determined. When a specified impulse is applied to the beam an impulsive load causes the largest deflection. When a specified amount of work is done on the beam the deflection is maximized by limiting the maximum pressure so only the static collapse deformation mode occurs. This result is independent of pulse shape. These conclusions are supported by comparisions of the deformation due to triangular, exponentially decreasing and double rectangular pressure pulses.

Stronge, WJ (Naval Weapons Center) *ASME Transactions* Vol. 41 No. 3, Series E, Sept. 1974, pp 604-608, 7 Fig., 9 Ref.

ACKNOWLEDGMENT: ASME Transactions
PURCHASE FROM: ESL Repr. PC, Microfilm

09 071758
MOVING LOAD ON A LAMINATED COMPOSITE
A solution is presented for the dynamic response of a periodically laminated half plane that consists of alternating layers of two different materials and is subjected to a moving load. The laminations are parallel to the surface of the half plane, and the velocity of the load is steady and supersonic. An effective stiffness theory developed by Sun, Achenbach, and Herrmann is used to model the layered material, and the formal solution is obtained with the aid of Laplace transforms. A far-field solution is constructed with the head-of-the-pulse procedure, and several numerical examples are presented.

Sve, C (Aerospace Corporation); Herrmann, G (Stanford University) *ASME Transactions* Vol. 41 No. 3, Series E, Sept. 1974, pp 663-666, 3 Fig., 1 App.

ACKNOWLEDGMENT: ASME Transactions
PURCHASE FROM: ESL Repr. PC, Microfilm

09 071782 RAIL STEEL

Over a limited range, the effect of mean stress has been studied on fatigue crack propagation and on the critical fatigue crack size associated with sudden fast fracture in center-notched plate specimens of a rail steel under pulsating loading. The results have been presented in terms of the stress intensity factor range K and the ratio R of the minimum to maximum stress. Increasing R was found to both accelerate cracking and reduce the critical crack size at instability. The data have been correlated with three crack growth equations currently used in the literature and it was found that the equation of Forman et al. relating crack growth rate to K and R gave the best fit. This equation was used to predict life in the finite range of the S-N curve. Fractographic examination revealed that the fracture surfaces were complex and a number of fracture modes contributed to cracking.

Evans, PR (National Physical Laboratory); Owen, NB McCartney, LN *Engineering Fracture Mechanics* Vol. 6 No. 1, Mar. 1974, pp 183-193, 8 Ref.

ACKNOWLEDGMENT: EI (EI 74 0801972)
PURCHASE FROM: ESL Repr. PC, Microfilm

09 071797
APPLICATION OF THE COATING SYSTEM TOGETHER WITH THE ZINC COATING FOR THE PROTECTION OF STEEL BRIDGES

The coating system together with the zinc coating is reported to be resistant to the severe corrosive environment and highly durable. The zinc spray coating and the zinc-rich paint are used as the zinc coating. Methods of coating, the surface preparation before painting, application of this coating system to steel bridges and the repainting are reviewed in this paper.

Sato, Y *Railway Technical Research Institute* Quart Rpt. Vol. 48 No. 5, May 1974, pp 8-13, 8 Ref

ACKNOWLEDGMENT: EI (EIX740804601)
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

09 071829
THE DETERMINATION OF STRESSES IN ROLLING-CONTACT ELEMENTS

Stress patterns in lubricated rolling-contact elements have been computed from surface pressures and temperatures between pairs of rolling disks, both cylindrical or both crowned, measured by means of evaporated surface transducers. The maximum mechanical shearing stresses computed for both cylindrical and crowned disks proved to be nearly equal to those that would have occurred under static contact, but the calculated depth of those stresses was reduced for cylindrical rollers in dynamic contact. The maximum shear reversals computed for rolling cylindrical disks were noticeably below the corresponding shear differences for the static cases. Local pressure anomalies, such as the pressure spike in the one particular case chosen for investigation, did not seem to alter significantly the shear-stress patterns. Thermal shearing stresses do not appear to be a significant portion of the maximum stress but do dominate over mechanical shearing stresses near the surface of the elements.

Contributed by the Lubrication Division of the American Society of Mechanical Engineers for presentation at the ASME-ASLE Lubrication Conference, Minneapolis, Minn., Oct. 18-20, 1966.

Kannel, JW Walowit, JA Bell, JC Allen, CM. (Battelle Memorial Institute)
American Society of Mechanical Engineers Paper 66-Lub-16, 1973, 12 PP, 17 Fig., 4 Tab., 13 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

09 072546
ANNUAL BOOK OF ASTM STANDARDS. PART 4. STRUCTURAL STEEL; CONCRETE REINFORCING STEEL; PRESSURE VESSEL PLATE; STEEL RAILS, WHEELS, AND TIRES

This volume contains the specifications for structural steel; steel for concrete reinforcement and prestressed concrete; steel plate and rivets for boilers and pressure vessels; steel rails and accessories, wheels, axles and tires. Of the 113 standards, 20% are new, revised or changed in status since the 1973 edition. Among the new standards are: A specification for special requirements for steel plates for nuclear and other special applications; specification for quenched and tempered carbon steel plates for structural applications. A metric practice guide is included.

ASTM, Standards Book No. t4, Apr. 1974

ACKNOWLEDGMENT: EI (EIX740604452)
PURCHASE FROM: ESL Repr PC, Microfilm

09 072580
FUNDAMENTALS OF FRACTURE MECHANICS

This text deals mainly with the macromechanics of fracture. However, consideration is given also the microscopic aspects particularly with regard to the use of models that are devised to show why cracks propagate and voids coalesce at particular stresses or strains. Notched bars and crack tip phenomena are discussed in considerable detail, as are fracture toughness testing methods and the cleavage-fibrous transition.

Knott, JF
Halsted Press 1973, 273 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Halsted Press 605 Third Avenue, New York, New York, 10016 Orig. PC

09 072587
DECAY AND TERMITE CONTROL INVESTIGATION—FINAL INSPECTION OF SPECIMENS AFTER 180 MONTHS EXPOSURE. RESULTS OF LONG-RANGE TESTS ON WOOD PRESERVATION

A 15-year investigation was initiated in 1957 in order to determine the long-range effects of termite attack and decay on wood as well as to evaluate the protective effects of various commercial preservatives of various retentions towards the reduction of termite attack and decay. The changes were observed and recorded annually of nearly 2,000 test specimens which reflected all the significant test variables of species of wood and type and retention of preservative. The results of these recorded observations have been analyzed and evaluated and conclusions derived, which are as follows: 1. Decay occurred to a greater extent and generally progressed faster than termite damage. 2. The results of this investigation indicated that coal tar creosote and the solution of creosote with coal tar or petroleum are the most effective preservatives; chromated zinc chloride and fluor-chrome-arsenate-phenol—type A afford the least protection against decay and termite attack. 3. The protection (as reflected in the average index rating) increases with the retention of the preservative in the specimens. 4. Untreated oak is somewhat more resistant to decay and termite attack than fir or pine, but only for a short time. 5. The results of this control test show that the life span of wood, when exposed to decay and termite attack environments, can be increased considerably by the application of the proper type and amount of preservative.

Somogy, C *AREA Bulletin* Proceeding Vol. 76 Bulletin 649, Sept. 1974, pp 137-142

ACKNOWLEDGMENT: AREA Bulletin
PURCHASE FROM: AREA Repr. PC

09 072588
METALLURGICAL EXAMINATION AND PHYSICAL TEST RESULTS OF CHROMIUM AND MANGANESE—VANADIUM ALLOY RAIL STEEL INVESTIGATION

This report contains the results of metallurgical examinations and laboratory accelerated testing of samples of chromium and manganese-vanadium rail to determine the quality and strength of these types of rail steel. The rail samples, for purposes of this investigation, of both types of rail were furnished to the AAR Technical Center by the Canadian Pacific Limited. The investigation consisted of rolling-load tests, drop tests, slow bend tests, physical property determinations, charpy impact tests, chemical analysis, hardness surveys and macroscopic and microscopic examinations conducted at the AAR Technical Center, Chicago.

Schoeneberg, KW *AREA Bulletin* Proceeding Vol. 76 Bulletin 649, Sept. 1974, pp 65-98, 25 Fig., 9 Tab.

ACKNOWLEDGMENT: AREA Bulletin
PURCHASE FROM: AREA Repr. PC

09 072673
THE EFFECT OF THE STATE OF STRESS ON THE STRAIN AT FRACTURE
Tension tests on solid cylindrical specimens and internal pressure tests on one type of tubular specimen showed that a superimposed hydrostatic pressure increased the ductility. Internal pressure tests on a similar tubular specimen that was supported in a different manner showed that the hydrostatic pressure had almost no effect on the ductility.

This paper was contributed by the Materials Division for publication in the Journal of Engineering Materials and Technology.

Davis, EA (Westinghouse Research Laboratories)
American Society of Mechanical Engineers No. 74-MAT-K, May 1973, 5 pp, 3 Fig., 2 Tab., 5 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

09 072674
STRESS DISTRIBUTION IN JOINTS OF BOLTED OR RIVETED CONNECTIONS
Many trials have been carried out recently to determine the stress distribution in bolted and riveted joints, and also the joint stiffness, which is of extreme importance in the design of such joints. The problem could not have been till now satisfactorily treated analytically. That forced many designers to handle it experimentally as the known theories do not confirm with the test results.

This paper was contributed by the design engineering Division of ASME for publication in the Journal of Engineering for Industry.

Motosh, N (Assiut University, Egypt)
American Society of Mechanical Engineers No. 74-DE-M, Jan. 1974, 5 pp, 8 Fig., 6 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

09 072675
REFERENCE STRESS DESIGN CHARTS FOR BEAM STRUCTURES
Reference stresses and scaling factors are determined for some common beam structures and the results are presented in practical design charts. One set of charts treats the influence of cross-sectional shape and another set the influence of the structural layout. The approximations of the reference stress technique are discussed and the error in deformation rate is calculated for the structures. The reference stress method and the use of the design charts is demonstrated in the creep design of a simply supported uniformly loaded beam.

This paper was contributed by the Materials Division for publication in the Journal of Engineering Materials and Technology.

Johnsson, A (Chalmers University of Technology, Sweden)
American Society of Mechanical Engineers No. 74-Mat-Q, Feb. 1974, 8 pp, 11 Fig., 17 Ref., 2 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

09 072676
FORMABILITY OF ALUMINUM ALLOY SHEETS
High strength-to-weight ratio materials are becoming of increasing importance in the automotive industry. Some aluminum alloy sheets offer strength equivalent to low-carbon sheet steel at one third of the weight. However, for these alloys no production stamping experience exists and little meaningful laboratory data have been accumulated. This study was conducted to provide such laboratory information. Complete tensile properties and forming limit curves (FLC), as measured by a laboratory technique developed by the author, were determined for the aluminum alloys with a wide range of properties and were compared to the properties of low-carbon steel. All the aluminum alloys were found to have lower FLC's, lower r values and equal or lower strain hardening capacities than sheet steel. Therefore their formabilities will be less than those of steel for all modes of sheet forming. This predicted press performance was verified for some of these alloys in limited press trials on a deck lid (inner panel) stamping.

This paper was contributed by the Materials Division of ASME for presentation at the winter Annual Meeting, 17-22 November 1974, New York, New York.

Hecker, SS (General Motors Corporation)
American Society of Mechanical Engineers No. 74-WA/Mat-2, Dec. 1973, 8 pp, 12 Fig., 3 Tab., 13 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

09 072693
ASSESSING THE SIGNIFICANCE OF FLAWS IN WELDS SUBJECT TO FATIGUE
The substitution of fracture mechanics crack propagation data for simple S-N curves provides additional data on welds defects, other than applied stress and the influence of geometry. It allows the fatigue process to be entered (variation in initial flaw size) and left (variation in failure criterion) at will and variations in geometry and crack share to be taken into account. The value of the method has been confirmed by accurately predicting the fatigue behavior of fillet welds containing flaws on the basis of the generalized stress parameter.

Maddox, SJ (Welding Institute) *Welding Journal* Vol. 52 No. 9, Sept. 1974, pp 401-409, 38 Ref.

ACKNOWLEDGMENT: EI (EI 74 067198)
PURCHASE FROM: ESL Repr. PC, Microfilm

09 072694
SOME RELATIONSHIPS BETWEEN FRACTURE TOUGHNESS, APPLIED STRESS OF STRAIN AND FLAW SIZE
For low values of strain divided by yield strain, more accurate measures of displacement are required so that large errors are not involved when determining strain and strain divided by yield strain values. Measurements to 1x10 to the minus 3rd power in. should be sufficiently accurate for elastic displacements of the order of 35x10 to the minus 3rd power in. Testpiece geometry and flaw type have a significant effect on non-dimensional crack open displacement versus strain over strain yield. Surface flaws (part through the thickness) exhibit more developed COD at the same applied strain level than either the double edge notched or center notched tension geometries. Data are also included for determining critical flaw sizes for failure by brittle fracture.

Egan, GR *Welding Research International* Vol. 4 No. 1, 1974, pp 1-18, 17 Ref.

ACKNOWLEDGMENT: EI (EI 74 067195)
PURCHASE FROM: ESL Repr. PC, Microfilm

09 072789
AUTOMATED DESIGN OF ADVANCED COMPOSITE STRUCTURES
Advanced filamentary composite materials are playing an increasing role in the aerospace industry. Before curing, their form as flexible tape or wide goods provides manufacturing advantages over metals resulting in cost savings in many cases. In addition, the physical characteristics of stiff fibers in a soft matrix can provide superior fracture and fatigue properties when combined with proper detail design techniques. Several methods of laminate optimization for strength and stiffness requirements have been developed. Some of these have been extended to include plate stability and, in some cases, sandwich and stiffened plate construction. Computer programs have also been developed for the design of more complex composite structures such as stiffened cylinders, wing box sections, and lifting surfaces including aeroelastic requirements. These procedures are discussed along with their limitations and utility considering current design philosophy.

Presented at the ASME AMD Meeting, Nov. 17-21, 1974 held in New York, N.Y.

McCullers, LA (LTV Aerospace Corporation)
American Society of Mechanical Engineers Vol. 7 1974, pp 119-133, 21 Ref.

ACKNOWLEDGMENT: EI (EI 74 068409)
PURCHASE FROM: ESL Repr. PC, Microfilm

09 072791
METALLURGICAL FACTORS CONTROLLING THE FRACTURE TOUGHNESS OF WELD MICROSTRUCTURES, WITH PARTICULAR REFERENCE TO THE MICROMECHANISM OF FRACTURE INITIATION
To link fracture toughness measurements specifically to particular micromechanisms, correlations between toughness, microstructure and composition must be related directly to the mechanism of initiation by inspection of the fracture surface in the region of the specimen notch after testing. Some factors which are beneficial to resistance to cleavage may be deleterious as regards resistance to microvoid coalescence and that, for optimum toughness over a wide range of temperature, applied strain rate and stress state, compromises in composition are required. However where, in a given application, only one micromechanism of fracture is of concern, efforts can be more simply concentrated on optimizing composition and welding procedure to produce HAZ and weld metal microstructures having the maximum resistance to fracture by this particular mechanism, subject, of course, to any other requirements, such as retaining adequate tensile properties and resistance to weld cracking problems.

Presented at Practical Implications of Fracture Mechanics, Spring Meeting, University of Newcastle Upon Tyne, England, March 27-29, 1973.

Dolby, RE (Welding Institute); Saunders, GG Widgery, DJ
Institute of Metallurgy Conf Paper Ser2,No.10,604-73-Y, 1973, 10 Ref.

ACKNOWLEDGMENT: EI (EI 74 074677)
PURCHASE FROM: ESL Repr. PC, Microfilm

09 072792
APPLICATION OF FRACTURE MECHANICS TO RAILWAY FAILURES
The authors have attempted to demonstrate both the potential and the current limitations of fracture mechanics in the context of railroad engineering. The principal limitations are the need for detailed service stress data and the establishment of appropriate K-calibrations. The benefits of applying a fracture mechanics approach to railway failures are discussed. In failure investigations, fracture mechanics enables the failure stress to be estimated.

Cannon, DF Allen, RJ *Railway Engineering Journal* Vol. 3 No. 4, July 1974, pp 6-23, 41 Ref.

ACKNOWLEDGMENT: EI (EI 74 072829)
PURCHASE FROM: ESL Repr. PC, Microfilm

09 072849
ELECTRIC CONDUCTIVITY OF ASPHALT LAYER IN RAILROAD CONSTRUCTION [Elektrische Leitfaehigkeit von Asphaltbelaegen fuer den Eisenbahbau]
Electric actuation of railroad signals assumes existence of sufficient electric resistance between rails. Measurements of electric conductivity of asphalt-concrete and mastic asphalt have been carried out. Superiority of mastic asphalt has been ascertained. [German]

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Kaegler, SH Stever, FW (Deutsche Shell AG) *Bitumen* Vol. 31 No. 5, 1969, pp 136-140

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: ESL Repr. PC, Microfilm

09 072953
THE SOLIDIFICATION OF CASTINGS
The properties of a cast metal object are largely determined by how it solidifies and with the events that take place as the molten metal cools in the mold, cooling being critical in the process. Advances in understanding these events make it possible to control them. The way is opened to new forming methods including continuous casting, die casting of ferrous metals and the casting of composite materials.

Flemings, MC *Scientific American* Vol. 231 No. 6, Dec. 1974, pp 88-95, Figs.

ACKNOWLEDGMENT: Scientific American
PURCHASE FROM: Scientific American Incorporated 415 Madison Avenue, New York, New York, 10017 Repr. PC

09 080085
PORTLAND CEMENT CONCRETE
This collection of six papers reflects the diverse approaches and the variety of operations that characterize the production of concrete, research into its behavior and universality of its use in transportation facilities. Two discuss the strength of concrete, based on theoretical and laboratory studies. Two papers deal with the application of microscopic examinations to the characterization of concrete taken from construction. The final two reports are on materials used for curing and protective treatment of concrete.

Transportation Research Record #504, 1974, 71 pp, Figs., Tabs., Phots., Refs.

PURCHASE FROM: TRB Repr. PC

09 080101
STRUCTURAL PLASTIC FOAMS: CURRENT STATUS
Structural plastic foam refers to a class of "rigid" plastic materials possessing integral unfoamed skins and an expanded core. Typical structural foams exhibit a core density of 480-800 kg/cu m (30-50 lb/cu ft), 50 to 20 percent air, and are characterized by excellent strength and toughness. Because of reduced weight and unique design capabilities, structural foams are finding increased usage in a variety of applications.

Archer, EW Bergstrom, DH *ASME Journal of Mechanical Engineering* Vol. 96 No. 11, Nov. 1974, pp 23-28, 4 Fig.

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

09 080107
FAILURE ANALYSIS WITH THE ELECTRON MICROSCOPE
The author of this book has studied, by transmission electron microscopy, the characteristic failure modes of metals resulting from various known mechanisms and has applied the techniques developed to determine service failures and to settle negligence claims in commercial service. Some observations made in these studies form the basis of this book. The book contains an introduction to different failure modes in metals, factors which are important in failure analysis, and specimen preparation for failure analysis by electron microscopy. The behavior of metals under various physical forces, such as static, dynamic, and cyclic loads, are reviewed. The types of corrosive attack by environment, stress corrosion, wear, hydrogen embrittlement, and high-temperature creep are discussed. The microstructural changes in metals caused by these different load, environment, and temperature effects, and the resulting modes of failure are described. The goal has been to show how these failure modes can be identified by the use of the electron microscope while holding the complicated theoretical aspects of the subject to a minimum.

Tiner, NA
Fox-Mathis Publishing Company 1973, 177 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Fox-Mathis Publishing Company 72663/4 Sunset Boulevard, Los Angeles, California, 90046 Orig. PC

09 080111
HOW WOOD FAILS UNDER STRESS
Wood as a natural composite material is not only unique in its intricate design but also superior to anything even attempted by the most advanced materials science. Although striking similarities exist between Nature's own composite and those produced synthetically by combining reinforcing fibres with a matrix of high polymers or similar materials, the composite structure of wood is exceedingly complicated compared with the simple structure of, for example, carbon fibres embedded in a synthetic resin. Wood is totally unique in being a sort of dual composite, the one being part of and incorporated into the other. The order of magnitude of the one composite system is microscopic, while its components consist of composites on a submicroscopic level with a complex composite ultrastructure.

Borgin, K (Hamburg University, Germany) *New Scientist* Vol. 64 No. 294, Nov. 1974, pp 556-560

ACKNOWLEDGMENT: New Scientist
PURCHASE FROM: IPC Magazines Limited 66-69 Great Queen Street, London WC2 5DD, England Repr. PC

09 080299
DATA DISPLAY REPORT ON RESULTS OF TESTS ON MILL PLATE SAMPLES AND SAMPLES REMOVED FROM TANK CARS INVOLVED IN ACCIDENTS. PHASE 03 REPORT
One of the primary objectives of the Phase 03 "Material Study" was to assemble, through tests, the physical, chemical and metallurgical properties of: (1) Steels currently used in tank car fabrication (mill plate samples); (2) Steel samples removed from tank cars involved in accidents. To accomplish Item 1, steel samples were obtained from several of the tank car companies sponsoring the RPI-AAR Project. These samples included both shell and head plate steels and reflected various conditions of heat treatment. Steels rolled in both domestic and foreign mills were included in the program. The steel producers are identified by a code letter only since the program objective is to establish data ranges for similar steels and not to isolate particular producers. Steel samples under Item 2 above were collected by the AAR Research Center prior to the formation of the RPI-AAR Project (Glendora, Miss.; Troup, Texas; Lehigh, Kansas) and by the RPI-AAR Project team from accidents which occurred since that time (Crescent City, Ill.; South Byron, N.Y.; Callao, Mo.; Kamloops, B.C.; Houston, Texas). Metallurgical reports have been previously issued by the Project based on examination of samples from Crescent City and South Byron. The purpose of this report is to simply display all test data in tabular and graphical form in order to make it immediately available. Analysis of results, conclusions and possible recommendations will be made in the final Phase 03 report and in the Overall Project Report. This report is organized as follows: Tables 1 through 10 list all the steel samples tested and tabulate their properties and the primary results of the tests. Figures A through K shown the location of the steel samples removed from cars involved in accidents and show their relationship to the fracutre patterns in the tank plates. Finally, the results of all the Charpy V-Notch tests are given in Figures 1 through 43, the Dynamic Tear Tests in Figures 44 through 84, and the Drop Weight Tear Tests in Figures 85 through 93.

Olson, LL
Association of American Railroads Research Center, (RA-03-3-13) R-136, Apr. 1972, 122 pp, 93 Fig., 10 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

09 080311
MANUFACTURE OF WEAR-RESISTANT RAIL STEEL BY THE OXYGEN-CONVERTER METHOD WITH SUBSEQUENT VACUUM TREATMENT OF THE MOLTEN STEEL [Erzeugung von verschleissfestem Schienenstahl nach dem Sauerstoffblasstahl-Verfahren mit nachfolgender Vakuumbehandlung des flussigen Stahles]
The special advantage of the described method of rail-steel manufacture is in the recording of all measured quantities and their exact reproducibility. This results in high uniformity of the melts coupled with the lowest possible hydrogen and oxygen contents. [German]

Hammer, R Phlipsen, D Schmedders, H Trenkler, J
Eisenbahntechnische Rundschau Vol. 23 No. 1, Nov. 1974, pp 463-468, 11 Fig., 13 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC, Microfilm

09 080336
ANALYSIS OF FRACTURE BEHAVIOR OF TANK CARS, PHASE 12 REPORT
The objective of Phase 12 of the RPI-AAR Tank Car Safety Project is to explain fundamentally the phenomena of tank car fracture behavior in accidents, particularly those fractures which led to violent ruptures. The Battelle Columbus Laboratories was engaged to conduct this research and Battelle's final report on the study is included. Battelle's charge was to examine all accident data accumulated under the RPI-AAR Project and to supplement this with tests, accident site investigations, and other studies, as appropriate, to explain why the fractures behaved as observed. Based on the results, Battelle was asked how tank car modifications would alter the fracture behavior. This was done for all observed types of fracture patterns which were catalogued in scenario fashion. Conclusions are drawn on the effectiveness on reducing accident losses of various tank car modifications, particularly in the area of steel metallurgy and tank fabrication. These conclusions will be combined with the results of the RPI-AAR Phase 02 accident review to establish cost-effectiveness for each modification. From this recommendations will be made in the Overall Project Summary Report RA-00-1-22.
An RPI-AAR cooperative program.

Phillips, EA Wenk, RL Fessler, RR Eiber, RJ
Association of American Railroads Research Center Ra-12-2-20(R-143), Sept. 1972, 187 pp, 31 Fig.

ACKNOWLEDGMENT: Association of American Railroads Research Center
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

09 080369
AN INTRODUCTION TO THE FRACTURE MECHANICS OF RAILROAD MATERIALS
This report is intended to serve as a primer for railway personnel on the subject of fracture mechanics. Most structural materials contain flaws or cracks that are introduced during fabrication or service. Under various combinations of static and alternating loads and reactive environments, these flaws begin to grow slowly and stably. Unstable fracture leading to complete structural failure occurs when a flaw has developed to a critical size. The critical flaw size is a function of both the applied and/or residual stresses acting on the structure, and the toughness of the materials. The principles of linear elastic fracture mechanics can be used to describe the functional relationships for unstable (brittle, rapid) fracture that occurs even though nominal stresses are below the general yield strength (i.e., before full-plasticity has occurred in the structure). The effects of temperature, composition, strain rate and microstructure are discussed using data gathered from railway materials.
Direct requests to the Director's Office, AAR Technical Center, Chicago, Illinois.

Tetelman, AS Stone, DH
Association of American Railroads Research Center, (R0917) R-157, May 1974, 27 pp, 11 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

09 081208
HIGH/STRENGTH STEELS HELP SOLVE WEIGHT AND SHORTAGE PROBLEMS
High-strength sheet steels are a family of modern materials that can help the designer solve current problems in a practical and efficient manner. Some of these design problems, which are becoming increasingly significant, include the need to reduce weight, improve performance, meet safety and environmental requirements, and more effectively cope with the continuing shortage of steel. High-strength carbon and high-strength low-alloy (HSLA) steel sheet materials are now available with the capability of both forming and welding, which permits them to meet specific design requirements and to be cost-effective in a greater number and variety of applications.

ASME Journal of Mechanical Engineering Vol. 97 No. 1, Jan. 1975, pp 20-25

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

09 081259
THE TECHNOLOGY OF STEEL FIBRE REINFORCED CONCRETE FOR PRACTICAL APPLICATIONS. SOME PRACTICAL APPLICATIONS OF STEEL FIBRE REINFORCED CONCRETE
Fibre-reinforced concrete is concrete containing round or flat steel fibres with dimensions of less than a millimetre, from 10 to 80 mm long and either straight or sinusoidal in shape. In principle, fibres are randomly distributed to give concrete with isotropic resistance but, sometimes, the fibres are placed in a specific direction to strengthen the concrete's resistance in this particular direction. The article describes the technology of preparing the concrete and gives its properties. Diagrams show the increased bending and compressive strength. The fibres prevent cracking or, at least, slow up the spread of cracks. Resistance up to temperatures of

1000 deg F and thermal conductivity are improved. Lastly, its energy absorption capacity means it is highly resistant to impact and the connected disintegration effect. The second article describes supporting slabs, pipes, floors and tunnel linings made with this concrete and their behavior.

Swamy, RN *Institution of Civil Engineers, Proceedings* Vol. 56 May 1974, pp 143-159, 10 Fig., 2 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1123)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

09 081625
A GENERAL METHOD FOR THE FATIGUE RESISTANT DESIGN OF MECHANICAL COMPONENTS. PART 2: ANALYTICAL
This paper develops the general analytical solution to the design of mechanical components under fatigue loading. Its only limitation is that the overloading lines must be a straight line on the sigma a-sigma m diagram. The designer is free to select his own failure theory for the material he intends to use as well as to select his own fatigue fracture criterion.

This paper will also be published in the ASME Journal of Engineering for Industry.

Vaughan, DT Mitchell, LD
American Society of Mechanical Engineers Paper #74-WA/DE-5

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: ASME Repr. PC

09 081626
A GENERAL METHOD FOR THE FATIGUE-RESISTANT DESIGN OF MECHANICAL COMPONENTS. PART 1: GRAPHICAL
Presented is a graphical method for the direct solution of fatigue design problems where the mode of overloading is to be taken into account. The material fatigue failure diagram is modified to give a new failure diagram called the safety diagram. The infinity of possible component designs is described by a line called the locus of design points. The intersection of the locus of design points with the safety failure diagram yields a direct design solution. Because of graphical difficulties, the method is limited to those cases where the locus of design points and the load lines are straight lines.

This paper will also be published in the ASME Journal of Engineering for Industry.

Mitchell, LD Vaughan, DT
American Society of Mechanical Engineers Paper #74-WA/DE-4

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: ASME Repr. PC

10 052501
NOISE ABATEMENT ON DIESEL LOCOMOTIVES. SUMMARISING PRESENTATION OF THE MEASURES ADOPTED FOR THE ABATEMENT OF NOISE AND VIBRATIONS ON DIESEL-ENGINED RAIL VEHICLES
The report gives an outline of the theory of noise and vibration abatement, deals with measures affecting the design of the vehicle and with the special materials (insulating materials) required. It also contains guiding values for acceptable noise levels and a review of still unsolved problems concerning acoustics and vibration resulting from railway traffic. A more detailed treatment of the basic theories of noise and vibration abatement and a number of references to applications in practice can be found in Technical Document ORE DT 25. The information presented in this document had originally been intended to form part of report RP 7 and references to this document will therefore be found in the text. The report represents a summary of the questions dealt with by the B 104 and the E82 Specialists Committee respectively.

International Union of Railways B104/RP7/E, Oct. 1972, 61 pp, Figs., 4 Tab., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

10 057329
DERAILING AMERICA—GM'S MARK OF EXCELLENCE
This article considers the environmental consequences of the abandonment of urban rail systems, which resulted in millions of commuters switching to autos and requiring construction of superhighways. The case of the Pacific Electric Railway in Los Angeles is reviewed.

Arrow, L (Highway Action Coalition) *Environmental Action* Vol. 5 No. 21, Mar. 1974, pp 3-7, Figs.

PURCHASE FROM: Environmental Action Incorporated 1346 Connecticut Avenue, NW, Room 741, Washington, D.C., 20036 Repr. PC

10 057335
NOISE CONTROL AND CIVIL ENGINEERING
The civil engineer will have to solve meaningful noise control problems in critical areas. This paper identifies critical areas, sets forth methods of solution and gives specific examples of problems. Inadequacies in the present education of civil engineers are pointed out and curricula are recommended that will add the necessary skills to deal with noise pollution. In the future, civil engineers will have to interact with noise control specialists in order to comply with environmental protection laws.

Krokowsky, EM Dym, CL *ASCE Civil Engineering* May 1974, pp 45-49

ACKNOWLEDGMENT: ASCE Civil Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

10 057352
NOISE AND VIBRATION OF A STEEL WHEEL/STEEL RAIL PERSONALIZED RAPID TRANSIT SYSTEM
The report describes a test program which has been conducted to establish baseline noise levels and ride characteristics for a state-of-the-art steel wheel on steel rail personalized rapid transit vehicle. A full-scale test vehicle and an 840-foot track, including two 30-foot curves, have been built and used for 128 test runs under various conditions of operation. Permanent records have been made on magnetic tape and oscillograph paper for future analysis as needed.

Gramse, HE Spence, JH
Transportation Systems Center DOT-TSC-UMTA-73-2, Jan. 1974, 84 pp

Contract DOT-TSC-436

ACKNOWLEDGMENT: NTIS (PB-232265/9)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232265/9, DOTL NTIS

10 057645
NOISE INVESTIGATION OF A RAILROAD DIESEL ENGINE
This study presents an investigation of noise generated by the vibration of structural components of a railroad diesel engine of the GM 645 E Series. A method of correlating the vibrations of certain high vibration components of any machinery with its total noise field has been developed. This method can be applied to a close semi-reverberant field in the presence of multiple noise sources of similar character. Furthermore, percentage contribution to the total noise from the individual structural components can be determined. One third octave band analyses of the effective engine noise and measured vibrations of the engine components have been performed. These vibration and noise signals have been cross-correlated.

Srivastava, NS Kumar, S
Illinois Institute of Technology Intrm Rpt. IIT-TRANS-74-1, May 1974, 195 pp

Contract DOT-OS-40103

ACKNOWLEDGMENT: NTIS (PB-232626/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232626/2, DOTL NTIS

10 057877
BART: A POSITIVE ENVIRONMENTAL IMPACT
Bay Area Rapid Transit is having a significant effect on the environment in four areas—energy consumption, air pollution, noise production and in its impact on the development of the land. BART offers substantial advantages or savings over the automobile in all but one of these—noise production, and even here, though a well-muffled automobile will produce slightly less noise than a BART train, the train is less noisy than freeway traffic. In terms of overall energy consumed, the savings over the automobile transportation will be large.

Passenger Transport Vol. 31 No. 41, Oct. 1973, p 18

PURCHASE FROM: American Transit Association 465 L'Enfant Plaza West, SW, Washington, D.C., 20024 Repr. PC

10 057930
NOISE LEVEL MEASUREMENTS OF RAILROADS: FREIGHT YARDS AND WAYSIDE
Noise from railroad operations were measured. Noise level data from freight yard operations were measured at the Argentine Freight Yard of the Santa Fe Railroad in Kansas City, Kansas and on a smaller scale in three facilities of the Boston and Maine Railroad in Boston Massachusetts. In addition, wayside noise data from passenger and line-haul operations were measured on the Penn Central Railroad in New Jersey and Massachusetts, and on the Santa Fe Railroad in Kansas. The report contains statistical temporal noise data, graphical time history level recordings, and one-third octave frequency spectra of selected data.

Rickley, EJ Quinn, RW Sussan, NR
Transportation Systems Center, (DOT-R-4520/OS-407) Final Rpt. DOT-TSC-OST-73-46, May 1974, 245p

ACKNOWLEDGMENT: NTIS (PB-234219/4)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-234219/4, DOTL NTIS

10 071618
THE DEMA EXHAUST EMISSION MEASUREMENT PROCEDURE FOR LOW AND MEDIUM SPEED INTERNAL COMBUSTION ENGINES
DEMA is an association of manufacturers of large, low and medium speed, diesel, dual fuel, and spark ignited gaseous fueled internal combustion engines. This paper describes DEMA's exhaust emission measurement procedure developed to meet the specific needs of the members of the association. The considerations in developing the procedure are set forth and discussed. What should be measured, what instruments should be used, and how the data should be presented are also discussed.

This paper was contributed by the Diesel and Gas Engine Power Division of ASME and presented at the Diesel and Gas Engine Power Conference and Exhibit, Houston, Texas, 28 Apirl-2 May 1974.

Newton, CL (Colt Industries)
American Society of Mechanical Engineers 74-DGP-9, Jan. 1974, 8 pp, 7 Fig.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

10 071620
LOCOMOTIVE EXHAUST EMISSIONS AND THEIR IMPACT
Exhaust emission measurements were made on three locomotive engines: an EMD 12-567, an EMD 16-645E-3, and a General Electric 7FDL16. Constituents measured included: total hydrocarbons, light hydrocarbons, CO, CO sub 2, NO (two methods), NO sub x, O sub 2, aldehydes, and smoke. The locomotives were operated in a stationary position at a diagnostic facility, and continuous analysis was employed for all constituents except light hydrocarbons and aldehydes. The emissions data acquired were used in conjunction with information on locomotive population and usage to estimate emission factors and national emissions impact.

This paper was contributed by the Diesel and Gas Engine Power Division of the ASME and presented at the Diesel and Gas Engine Power Conference and Exhibit, Houston, Texas, 28 April-2 May 1974.

Hare, CT Springer, KJ (Southwest Research Institute); Huls, TA (Environmental Protection Agency)
American Society of Mechanical Engineers 74-DGP-3, Jan. 1974, 19 pp, 12 Fig., 18 Tab., 17 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

10 071621
NO SUB X STUDIES WITH EMD 2-567 DIESEL ENGINE
Effectiveness of several methods for reducing oxides of nitrogen (NO sub x) emissions from a two-cylinder version of an EMD series 567C locomotive engine is discussed. The effectiveness of a particular method was determined by the amount of NO sub x reduction achieved, the observed effect of other emissions constituents and engine power, and the ease and potential expense with which the method could be implemented.

This paper was contributed by the Diesel and gas Engine Power Division of the ASME and was presented at the Diesel and Gas Engine Power Conference and exhibit, Houston, Texas, 28 April-2 May 1974. This paper is based on work performed under contract EHS70-108 with the Department of Transportation and Environmental Protection Agency.

Storment, JO Springer, KJ (Southwest Research Institute); Hergenrother, KM (Transportation Systems Center)
American Society of Mechanical Engineers 74-DGP-14, Jan. 1974, 12 pp, 8 Fig., 8 Tab., 7 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

10 071805
NOISE AND VIBRATION OF RESILIENTLY SUPPORTED TRACK SLABS
An analytical model is developed for the dynamic response, vibration isolation, and sound radiation of a resiliently supported track slab for subway trains. The general relations for response and radiation of the floated slab are considered in conjunction with rail vibration data to predict slab performance. Results show that the slab is a very effective vibration isolator but is a sounding board at low frequencies.

Bender, EK (Bolt, Beranek and Newman, Incorporated) *Acoustical Society of America, Journal of* Vol. 55 No. 2, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 806345)
PURCHASE FROM: ESL Repr PC, Microfilm

10 071989
NOISE-CON 73
Following is a list of titles and authors of the papers presented: Control of Noise and Vibration in Buildings Adjacent to Subways, by Anthony W. Paolillo. Effect of Noise Control Legislation on the Operation, Maintenance and Expansion of the New York City Transit System, by John T. O'Neill. Noise Exposure Study of the Massachusetts Bay Transportation Authority Rapid Transit System, by Edward G. Apgar and Thomas J. Trella. New York City Transit Noise, by R. Gerson and F.C. Hart. Methodology for Determining Minimum Cost Rapid Transit Noise Control, by Robert Lotz and Leonard G. Kurzweil. RCE Exhaust Noise Characteristics and Control, by Arnold A. Bergson. Automobile Tire Noise; A Review of the Open Literature, by William A. Leasure, Jr. Exhaust Systems for High-Performance, Four-Stroke Engines, by Larry J. Eriksson. Truck Tire Noise/Vibration, by W.F. Reiter, A.C. Eberhardt and L.J. Harper. Paolillo, AW O'Neill, JT Apgar, EG Trella, TJ Gerson, R Hart, FC Lotz, R Kurzweil, LG Bergson, AA Leasure, WA Eriksson, LJ Reiter, WF Eberhardt, AC Harper, LJ
National Conference on Noise Control Engineering. Proceeding

ACKNOWLEDGMENT: EI (EI 74 902465)
PURCHASE FROM: ESL Repr PC, Microfilm

10 072444
PREDICTION AND CONTROL OF RAIL TRANSIT NOISE AND VIBRATION. A STATE OF THE ART ASSESSMENT
As systems manager for the Urban Mass Transportation Administration's Rail Supporting Technology Program, the Transportation Systems Center has undertaken research in rail transit noise abatement. As part of this effort, this report contains the results of a critical review of current technology for the prediction and control of urban rail transit noise and vibration, with primary emphasis on the parameters affecting propagation paths. Specifically included are tools for the prediction of wayside noise and vibration adjacent to both at-grade and elevated transit track, groundborne noise propagation from subway tunnels, and noise in cars and in stations. In addition, several noise and vibration control techniques are evaluated including resilient rail fasteners, floating slabs, noise barriers, elevated structure enclosures, structural damping, and acoustical treatment of stations and tunnels. Specific recommendations are made for areas requiring further research and development. Two of these areas, elevated structure noise and groundborne vibration from tunnels, have been selected for continued investigation under this contract.

Manning, JE Cann, RG Fredberg, JJ
Cambridge Collaborative, Incorporated, (DOT-TSC-UMTA-74-6)
Intrm Rpt. UMTA-MA-06-0025-74-5, Apr. 1974, 254 pp

Contract DOT-TSC-643

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS Repr. PC

10 072449
SUPPRESSING NOISE AND VIBRATION IN THE SUBWAY
With extensions totalling 8.5 miles due for completion by 1977, partly through environmentally-sensitive areas along the route of the abandoned Spadina Expressway, Toronto Transit Commission acknowledges the need for continuing research to fill gaps in existing knowledge about noise and vibration problems. TTC has examined these in detail, and in many cases successful solutions have been developed to meet standards set by the Institute for Rapid Transit.

Murray, RJ (Toronto Transit Commission) *Railway Gazette International* Vol. 130 No. 9, Sept. 1974, pp 337-340, 4 Fig., 3 Phot., 4 Ref.

PURCHASE FROM: XUM Repr. PC

10 072573
ENVIRONMENTAL ASPECTS OF RAIL ELECTRIFICATION
Railroad electrification provides a viable and practicable means for reducing the air pollution from freight and passenger transportation operations. It reduces the line source emissions from highways and diesel trains to single stationary point source which may be in nonurban areas that can be more easily controlled. There could also be a reduction in noise pollution. If rail electrification involves coal fuel there would be a new range of air pollutants and the problem of reclaiming lands immediately after strip mining. Of importance, say the authors, is obtaining accurate information on energy conversion efficiencies for electrification, and comparative environmental, energy and economic impacts of alternative intercity transportation modes.

Proceedings of the conference held at the University of Wisconsin, May 6-8, 1974, sponsored by the Federal Railroad Administration and the Wisconsin Department of Transportation contained in "The Role of U.S. Railroads in Meeting the Nation's Energy Requirements."

Cooper, HBH, Jr Richards, HA
Wisconsin University, Madison Proc Paper Oct. 1974, pp 47-62, 4 Fig., 10 Tab., 15 Ref.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Wisconsin University, Madison Graduate School of Business, Madison, Wisconsin, Repr. PC

10 072665
OPTICAL MEANS OF MEASURING THE VISIBILITY OF LOCOMOTIVE EXHAUST
This paper describes how optical smokemeters can be used to accurately measure and record the visibility of locomotive engine exhaust. Data derived from these measurements can be utilized in helping to assess a level of engine performance for new locomotives being delivered from builders and for locomotives following major repairs. The data are also useful as documentary evidence to mitigate cases where a locomotive has been cited by regulatory authorities for alleged excessive smoking. Smokemeters are an important and effective means for monitoring visible locomotive exhaust emissions and enabling railroads to safisfy air pollution requirements.

This paper was contributed by the Rail Transportation Division of ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Shewmake, BR (Southern Pacific Transportation Company)
American Society of Mechanical Engineers No. 74-WA-RT-11, Aug. 1974, 12 pp, 7 Fig., 1 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

10 072666
EXHAUST EMISSIONS OF SELECTED RAILROAD DIESEL LOCOMOTIVES
Measurements were taken of the composition of exhaust gases from railroad diesel locomotives operating in normal service at various states of their respective maintenance cycles. A major objective was to determine how the exhaust quality of these engines related to emission standards for heavy-duty diesel powered highway vehicles. Results varied from unit to unit, but generally indicated that improvements would be necessary if such regulations were applied to railroad diesels. Another primary objective was to develop basic information on concentrations of important exhaust constituents and to determine whether existing analytical techniques and instrumentation were sufficiently developed to provide reliable and reproducible data on the composition of diesel engine exhaust and the quality of visible emissions. Results indicate that specific concentration of exhaust constituents are a function of engine design and the physical condition of the engine. Furthermore, currently available analytical equipment can be used with confidence for measuring carbon monoxide, oxides of nitrogen, and unburned hydrocarbons in samples taken from the exhaust of diesel locomotives. Techniques and methodology were tested to the extent that reproducible results were obtained for the preceding constituents.

This paper was contributed by the Rail Transportation Division of ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Bryant, AH Tennyson, TA (Southern Pacific Transportation Company)
American Society of Mechanical Engineers No. 74-WA/RT-1, July 1974, 7 pp, 8 Fig., 2 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

10 072711
RETARDER NOISE
Retarders are mechanical devices used in classification yards to reduce the speed of a car leaving the "hump" to that required to allow it to just reach its particular destination in the yard. The action of the retarder itself generates noise and also causes the car wheels to generate noise. It is with the latter problem that this paper is concerned. Certain assumptions relative to the mechanics of the noise generated were made and tested. Based on the information obtained, ramp control (original with the Canadian National) was introduced to average the retarder pressure throughout the retarder transit period. Controlled lubrication of the noise generating surfaces was later added to the ramp control feature. The combination created a significant reduction in the percentage of wheels that squealed and the level of the noise which this number generated.

This paper was contributed by the Rail Transportation Division of the ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Cass, R Berthiaume, PP Kalita, RE Lamont, JG (Canadian National Railways)
American Society of Mechanical Engineers NO. 74-WA/RJ-7, Apr. 1974, 7 pp, 13 Fig.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

10 072712
NOISE LEVELS IN RAILROAD OPERATIONS
This paper presents a discussion on the major noise-producing operations both in railroad yards and for on-line operations, and quantifies typical noise outputs from these activities. The variables which influence this noise production are also discussed as well as the formulation of suitable mathematical synthesis models for noise prediction analysis.

This paper was contributed by the Rail Transportation Division of ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Swing, JW (Wyle Laboratories); Inman, DJ (Atchison, Topeka and Santa Fe Railway)
American Society of Mechanical Engineers No. 74-WA/RT-8, July 1974, 8 pp, 3 Tab., 9 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

10 072768
SUPPRESSION OF NOISE AND VIBRATION ON LONDON TRANSPORT'S UNDERGROUND LINK WITH HEATHROW AIRPORT
To reduce noise concrete trays supported on rubber blocks were used to carry the first mile of track. The track-trays weigh 20 tons and are manufactured on site. The rubber bearing-pads incorporate reinforcement layers of steel plate, are in five sizes. The trays which are 10-ft 10-ins wide and 22-ft 3-in long, are laid at 25-ft centers longitudinally and the remaining 2-ft 9-in gap between the trays is cast in situ. Projecting reinforcing bars from the ends of the trays are provided for this purpose and, by this means, continuous track-deck lengths of about 600-ft are laid, 3-in gaps being left at these intervals to allow for thermal expansion.

Rail Engineering International Vol. 4 No. 6, July 1974, pp 285-287

ACKNOWLEDGMENT: EI (EI 74 072844)
PURCHASE FROM: ESL Repr. PC, Microfilm

10 072769
NOISE CONSIDERATIONS ON A A HIGH-SPEED RAILWAY IN JAPAN
Studies of noise and vibration "pollution" caused by high-speed trains operating near residential areas are reported and means for their abatement are considered. Along the new Tokaido Line, the area where train noise now exceeds 85 dbA at 25 m from the track centerline extends over 200 km along the line, and for over 20 km train noise reaches 90 to 100 dbA. The noise mainly originates in wheels, rails, vibration of the rolling stock and vibration of the roadbed. Driving gears and current collectors pose no problem. The effects of noise on those dwelling along the line are two: emotional (annoyance, discomfort), and environmental (interference with such activities as conversation, telephoning, watching TV, reading, study, rest and sleep). These effects have been confirmed by a questionnaire-type survey of the community response of those living within 200 m of the tracks. Japanese highway-environment noise standards specifying a 60 to 65 dbA peak noise level is found by this survey to be what the railside community also seem to require. Proposed noise-abatement measures include: car-body weight reduction; maintenance of smooth wheels and rails (otherwise a 5 to 15 dbA noise increase can occur); vibration isolators between rails and roadbed; "low-hemline" shielding on cars; a noise baffle along the trackside; a 50 m buffer zone along the railway; a noise insulation wall between residence and tracks.

Nimura, T (Tohoku University, Japan); Sone, T Kono, S *Noise Control and Vibration Reduction* Vol. 5 No. 5, July 1974, pp 213-216

ACKNOWLEDGMENT: EI (EI 74 072842)
PURCHASE FROM: ESL Repr. PC, Microfilm

10 072787
EFFECT OF PISTON SLAP ON THE NOISE AND VIBRATION OF DIESEL ENGINES
A method of investigation piston-slap noise in diesel engines is described, and the following conclusions are reached: Piston slap mainly controls the cylinder block vibration and may be considered as a major source of engine noise and vibration. The oscillographic technique is the most reliable method to identify the contribution of piston slap and relating it to that associated with other exciting forces, such as combustion. Optimizing production tolerances, especially of the piston-to-bore clearance, could result in 2—4 dBa noise reduction. Simulation of piston slap is a convenient isolation technique to study this important source of noise on the engine and to establish the main controlling parameters affecting its contribution to overall engine noise and vibration.

Pullen, HL Haddad, SD *Noise Control and Vibration Reduction* Vol. 5 No. 5, July 1974, pp 204-207, 13 Ref.

ACKNOWLEDGMENT: EI (EI 74 069045)
PURCHASE FROM: ESL Repr. PC, Microfilm

10 072788
EFFECT OF VERY LOW AIR INTAKE TEMPERATURE ON THE PERFORMANCE AND EXHAUST EMISSION CHARACTERISTICS OF A DIESEL ENGINE
The paper describes some of the operational and exhaust emission characteristics of a single-cylinder direct-injection diesel engine that was operated warm under a wide range of intake air temperatures extending down to-45 F and occasionally-60 F. The operating range considered included the no-load and partially motored regions.

Presented at SAE Meeting, Sept. 9-12, 1974.

Karim, GA (Calgary University, Canada); Khanna, S
Society of Automotive Engineers Preprint #740718, Sept. 1974, 8 pp

ACKNOWLEDGMENT: EI (EI 74 069041)
PURCHASE FROM: ESL Repr. PC, Microfilm

10 072804
A STUDY OF THE MAGNITUDE OF TRANSPORTATION NOISE GENERATION AND POTENTIAL ABATEMENT. VOLUME V. TRAIN SYSTEM NOISE
Analysis of contemporary mass transit vehicle noise indicates that the rank order of conventional rail vehicle noise sources is: wheel and rail system; propulsion; and auxiliary equipment. Noise levels alongside the right-of-way, are a function of the vehicle type, its operation and the configuration of the roadbed and surrounding areas. For a given vehicle and guideway, the right-of-way configuration has the greatest impact on the sound levels received at a specific wayside location. Rail vehicle wayside noise levels can be reduced by interrupting the sound transmission paths between the vehicle and the receiver. To the extent that this is achieved, rail vehicle wayside noise levels can be reduced in a manner which is similar to that used for highway noise reduction.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Serendipity, Incorporated OST-ONA-71-1-Vol. 5, Nov. 1970, 118 pp

Contract DOT-OS-A-018

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: NTIS Repr. PC

PB-203186, DOTL NTIS

10 080069
VIBRATIONS DURING CONSTRUCTION OPERATIONS
The subject of earth vibrations related to construction operations is examined in perspective. Comparison of conventional demolition methods versus demolition by explosives is considered. Graphical data are presented illustrating the relative intensities of vibration from various construction equipment and sources. Finally these vibration intensities are compared to damage criteria and normal human evaluation criteria.

Presented at the ASCE Annual and National Environmental Engineering Meeting, New York City, N.Y., Oct. 29-Nov. 1, 1973.

Wiss, JF (Elstner and Associates, Incorporated) *ASCE Journal of the Construction Division* Vol. 100 No. CO3, Proc. Paper #10798, Sept. 1974, pp 239-246, 6 Fig., 2 App.

ACKNOWLEDGMENT: ASCE Journal of the Construction Division
PURCHASE FROM: ESL Repr. PC, Microfilm

10 080070
CONSTRUCTION NOISE-ITS ORIGIN AND EFFECTS
Construction noise as a source of community noise pollution is reviewed. The review, divided into five parts, is written so that an engineer not familiar with acoustics can be aware of the environmental effect of the large number of construction projects underway in the United States. The five parts consist of: (1) A review of recent noise legislation and standards with which to measure construction noise; (2) the physiological and psychological aspects of exposure to excessive noise; (3) the current technology with regard to reducing the noise radiation from construction equipment; (4) the impact upon the community in terms of the number of people exposed to excessive noise levels; and (5) a review of the efforts underway by the construction industry to reduce construction noise.

Hersh, AS (Hersh Acoustical Engineering) *ASCE Journal of the Construction Division* Vol. 100 No. CO3, Proc. Paper #10827, Sept. 1974, pp 433-448, 5 Fig., 8 Tab., 13 Ref., 2 App.

ACKNOWLEDGMENT: ASCE Journal of the Construction Division
PURCHASE FROM: ESL Repr. PC, Microfilm

10 080100
FUNDAMENTALS OF AIR POLLUTION
The book consists of four parts: elements of air pollution, effects of air pollution, meteorology, and control. It can be used as a text with college chemistry as a prerequisite. A relatively large proportion of the text is devoted to meteorology because of its projected importance to the student.

Stern, AC
Academic Press Incorporated 1973, 492 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Academic Press Incorporated 111 Fifth Avenue, New York, New York, 10003 Orig. PC

10 080211
WHEEL/RAIL NOISE AND VIBRATION CONTROL
Reported are the interim results of a program to develop a basic understanding of urban transit wheel/rail noise generation for application to the evaluation and improvement of wheel/rail noise control devices. The report critically reviews existing analytic models and related experimental findings for the wheel/rail dynamic system and for the three categories of wheel/rail noise generation: squeal, impact and roar. The limitations found result in recommendations for the remaining work required. A compilation is presented of existing or promising wheel/rail noise control devices, their acoustic and nonacoustic effects.

Remington, PJ
Bolt, Beranek and Newman, Incorporated, Transportation Systems Center, Urban Mass Transportation Administration Intrm Rpt. May 1974, 174 pp

Contract DOT-TSC-644

ACKNOWLEDGMENT: NTIS (PB-237012/0ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-237012/0ST, DOTL NTIS

10 080300
THE INFLUENCE OF RAILS ON TRAIN NOISE
This paper presents an evaluation of the dynamic interaction of steel wheels on steel rails and an estimation of the contribution of sound radiated by rails to total train noise levels. The interaction is modeled as a random process, for which dynamic forces at the wheel/rail interface are related to wheel and rail impedances and roughness wavenumber spectra. Roughness spectra, estimated from rail vibration data, are found to be proportional to the fourth root of the wavenumber. Comparing analytical predictions with measured data shows that the rail can be adequately modeled as a beam on an elastic foundation. Modeling the wheel as a simple mass reveals that at intermediate frequencies the wheel impedance is much higher than the rail impedance. Therefore, rail vibration levels are expected to be substantially higher than levels of wheel vibration. Analytical models of rail radiation, confirmed by experimental data acquired by shaking a rail in a reverberant chamber, show that rail radiation is efficient above 500 to 1000 Hz. When these models and data are combined, it is found that rail radiation may dominate at mid-and high frequencies

(between 500 and 5000 Hz), but it is less important than other sources outside of these frequency regimes.

Bender, EK Remington, PJ (Bolt, Beranek and Newman, Incorporated) *Journal of Sound and Vibration* Vol. 37 No. 3, 1974, pp 321-334, 10 Fig., 7 Ref.

ACKNOWLEDGMENT: Journal of Sound and Vibration
PURCHASE FROM: ESL Repr. PC, Microfilm

10 080416
AMERICAN TRANSIT ASSOCIATION RAIL TRANSIT CONFERENCE. WAYS AND STRUCTURES DIVISION SESSION. NOISE AND VIBRATION CONTROL PROGRAM
Noise and vibration control has been a primary consideration in the design of the Metro system. Consultants were engaged to provide basic acoustical designs and guidelines to assure patrons of quiet and comfortable environment on and off cars. Minimal impact of system construction on the community is planned. Operation through continuous maintenance program and good acoustical design is planned. WMATA's noise and vibration control objectives are to minimize transmission of noise and vibration to adjacent buildings and structures, and to maintain noise levels in transit vehicles and stations within acceptable limits. Notable acoustical improvements have been made since the building of early transit systems and these are listed.

Presented at Rail Transit Conference of American Transit Association.

Keyes, GW
Washington Metropolitan Area Transit Authority WMATA/ATA-74/2, Apr. 1973, 19p

ACKNOWLEDGMENT: NTIS (PB-237249/8SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-237249/8SL, DOTL NTIS

10 080418
STUDIES IN URBAN TRANSPORTATION. TRANSPORTATION SYSTEMS: NOISE GENERATION AND ABATEMENT
This report deals with the amount and intensity of transportation systems noise generation, along with efforts used to lessen the impact of noise. An introductory discussion of the physics of noise and noise measurement is given to help the reader in understanding how noise impact is analyzed. Transportation planners and designers must be aware of noise assault any proposed system will have on environment. The mandate for this stems from the National Environmental Policy Act of 1969 and the Federal-Aid Highway Act of 1970; the first requires assessment of all Federally funded projects to determine any adverse impacts on environment and the second, aimed at highways that are Federally funded, requires noise abatement of any proposed road that hasn't received approval before July 1, 1972. (Modified author abstract)

Hartl, FB
Wisconsin University, Milwaukee, Urban Mass Transportation Administration, (UMTA-WI-11-0003) Feb. 1974, 143p

ACKNOWLEDGMENT: NTIS (PB-236681/3SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236681/3SL, DOTL NTIS

10 081258
TRANSPORT TECHNIQUES WHICH ARE FAVOURABLE TO THE ENVIRONMENT [Umweltfreundliche Verkehrstechnik]
The author deals with noise and means of reducing noise in urban and suburban transport. The noise caused by road vehicles travelling at 50 km/h ranges between 67 and 86 decibels; that caused by railway vehicles at the same speed is between 73 and 86 decibels. It is absolutely necessary to reduce the propagation of noise. The author describes in detail the measures to be taken from the point of view of passengers, drivers and residents living in the area: (1) with regard to rail vehicles and track; (2) with regard to road vehicles. [German]

Puettner, G *Verkehr und Technik* Vol. 27 No. 5, 1974, 13 pp, 17 Fig., 5 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1120)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

10 081263
A CONTRIBUTION TO RESEARCH ON THE ORIGIN AND REDUCTION OF NOISE CAUSED BY RAILWAY VEHICLES ON CURVES [Beitrag zur Klarung des Entstehens und der Verhinderung von Kurvengerauschen bei Schienenfahrzeugen]
The authors analyse the frequency spectrum of noise travelling through the air and noise spread by steel structures and caused by wheel rims and rails. They note that the grinding noise is caused by friction between the wheel tread and the rail head on the horizontal plane, and not, as was thought formerly, by friction between the wheel flange and the side of the rail head. Noise travels through the wheels and the rail. It has not yet been determined where noise reduction measures should be applied to obtain the most effective results. [German]

Getzhold, C Bahlau, H *Leichtbau der Verkehrsfahrzeuge* Vol. 18 No. 3, May 1974, pp 68-71, 5 Fig., 2 Tab., 5 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1171)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

10 265273
NOISE CONTROL HANDBOOK FOR DIESEL-POWERED VEHICLES
The handbook has been prepared with the intention of assisting the truck fleet operator and the independent truck owner/operator in understanding and diagnosing noise problems and in selecting retrofittable components to lower truck exterior and interior noise levels. The handbook includes procedures for identifying and evaluating major truck noise sources, considerations for selection of acoustic materials, procedures for minimizing exhaust, intake and cooling fan noise, and methods for the minimization of in-cab noise levels. Appendixes give standard noise measurement procedures, muffler and intake filter selection data, cooling system design considerations and a list of known manufacturers of acoustic materials.

Damkevala, RJ Manning, JE Lyon, RH
Cambridge Collaborative, Incorporated, Transportation Systems Center, Office of Noise Abatement Intrm Rpt. May 1974, 214 pp

Contract DOT-TSC-587

ACKNOWLEDGMENT: NTIS (PB-236382/8)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236382/8, DOTL NTIS

11 052559
NEW TECHNOLOGIES FOR TRACKED GROUND TRANSPORT. STATE OF STUDIES AND EXPERIMENTATION ON UNCONVENTIONAL SYSTEMS APPLICABLE TO VERY HIGH SPEEDS
The report gives a survey of those principles of new techniques liable to offer certain prospects of future operational application. The report reflects the state of research and development as ascertained from visits to the firms concerned and the evaluation of the relevant literature, while also the replies to a questionnaire circulated by ORE to the competent state authorities were used for this purpose. Finally, a comparison is made between the selected criteria for the various systems, and an estimate is given on the developments to be anticipated. For purposes of evaluation additional use is made of the SYSMAG computation model.

International Union of Railways C135/RP 1/E, Apr. 1974, 47 pp, 19 Fig., 35 Ref., 7 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

11 057331
THE VERY HIGH SPEED TRANSIT SYSTEM
The Very High Speed Transit or "VHST" concept was put forward some years ago in response to the search for a pollution-free transport method that could operate at speeds competitive with aircraft. The general principles are relatively straightforward: electromagnetically levitated and propelled cars in an evacuated tunnel. The VHST is predicted as an addition to the future transportation scene and will offer not only a fast and convenient transit method but also a tunnel complex to house utility transmission and auxiliary freight-carrying systems.

Salter, RM
Rand Corporation #P-4874, Aug. 1972, 17 pp, 1 Fig.

ACKNOWLEDGMENT: Rand Corporation
PURCHASE FROM: Rand Corporation 1700 Main Street, Santa Monica, California, 90401 Repr. PC

11 057354
COMMUNICATION SYSTEMS FOR DUAL MODE TRANSPORTATION
The communications requirements of dual mode transportation systems are discussed for both the on-guideway and off-guideway modes. Candidate communication systems are classified according to their principle of operation, and the characteristics of the systems are described. The suitability of these systems is assessed on the basis of dual mode requirements, FCC restrictions, and physical and electrical limitations.

Eaves, RE Kodis, RD
Transportation Systems Center Final Rpt. DOT-TSC-UMTA-73-13, Feb. 1974, 44 pp

ACKNOWLEDGMENT: NTIS (PB-231907/7)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-231907/7, DOTL NTIS

11 057409
REDUCTION OF TACV POWER REQUIREMENTS BY MULTIPLE-STAGE AIR CUSHIONS
This paper shows that the power required for levitation for tracked air cushion vehicles can be significantly reduced by the use of multiple stage air cushions. A mathematical model for these air cushions is developed, and the air cushion pressures obtained from the model are compared with experimental pressures. It is shown that one of the most significant features of multiple stage air cushions is their inherent roll stability as opposed to an inherent instability for conventional air cushion designs. This inherent roll stability allows a significant reduction in the power required for levitation for tracked air cushion vehicles.

Eberle, WR (Purdue University) *Journal of Aircraft* Vol. 11 No. 3, Mar. 1974, pp 154-159, 6 Ref.

ACKNOWLEDGMENT: EI (EI 74 604962)
PURCHASE FROM: ESL Repr PC, Microfilm

11 057410
BLOCK SIGNAL INSTABILITY IN RAPID TRANSIT HEADWAY CONTROL
The headway control for a high speed transportation system where vehicles are moving along guideway is studied. The guideway is divided into blocks and the block signal is used for vehicles' speed control. The instability of the measured block signal is investigated. A method is devised to extract the actual block signal from the measured block signal.
Proceedings of the Southeast Conference, Reg 3 Conf, Louisville, Kentucky.

Jen, RT Hung, JC
Institute of Electrical and Electronics Engineers pp 867-873, 3 Ref.

ACKNOWLEDGMENT: EI (EI 74 604480)
PURCHASE FROM: ESL Repr PC, Microfilm

11 057421
AERODYNAMIC INTERFERENCE OF HIGH SPEED GROUND VEHICLES
A general two-dimensional, incompressible, potential flow numerical procedure has been used for the calculation of the unsteady interference loading on either a moving or a stationary high speed train configuration due to the passage of a second identical train. Transient loadings in the presence of crosswinds were of special interest to this study and are included. First estimates of the overall time dependence of the inviscid body forces and moments have been obtained by combining an approximate height integration with the numerical integration of the derived unsteady sectional pressure distributions over the body length. Results for specific body configurations, lateral separations and crosswind conditions are presented. Substantial unsteady aerodynamic interference loads are predicted at the higher approach speeds, especially under crosswind conditions. Critical design loading conditions are encountered when a stationary vehicle is passed by a similar moving vehicle.

Johnston, GW (Toronto University); Seshagiri, BV Ellis, ND
American Society of Mechanical Engineers Paper N74-FE-22, May 1974, 8 Ref.

ACKNOWLEDGMENT: EI (EI 74 604162)
PURCHASE FROM: ESL Repr PC, Microfilm

11 057424
ELECTRODYNAMIC SUSPENSION IN CONJUNCTION WITH THE IRONLESS, SYNCHRONOUS LINEAR MOTOR, INTRODUCED AT RECENT TESTS OF THE JAPANESE RAILROAD SYSTEM [Elektrodynamisches Schweben in Verbindung mit dem Eisenlosen Synchronen Linearmotor, Vorgestellt an Neueren Versuchen der Japanischen Eisenbahnen]
Tests performed with newly developed railroad propulsion techniques are reported. The advantages of electromagnetic suspension are pointed out. The use of superconducting magnetic coils is discussed.

Kiene, V *Elektrische Bahnen* Vol. 44 No. 11, Nov. 1973, pp 259-262, 8 Ref.

ACKNOWLEDGMENT: EI (EI 74 603106)
PURCHASE FROM: ESL Repr PC, Microfilm

11 057432
ALUMINUM FOR LINEAR MOTOR REACTION-RAILS [Aluminiumwerkstoffe fuer Linearmotor-Reaktionsschienen]
For contactless drives, specifically in new transportation systems, linear motors offer essential advantages. Existing and planned test facilities use aluminum reaction rails since they meet the requirements, are non-magnetic, and show corrosion resistance and variability of electric conductivity over a wide range. Factors in the arrangement of reaction rails and properties of aluminum alloys to be considered and manufacturing methods of reaction rails are discussed. [German]

Kuester, W (Leichtmetall, Germany); Jaron, H Koewius, A
Elektrotechnische Zeitschrift Ausgabe A Vol. 94 No. 8, Aug. 1973, pp 494-498, 9 Ref.

ACKNOWLEDGMENT: EI (EI 74 601822)
PURCHASE FROM: ESL Repr PC, Microfilm

11 057433
ELECTRICAL ENGINEERING IN THE TRACK-TYPE TRANSPORTATION SYSTEM OF THE FUTURE [Die Elektrotechnik im Spurgebundenen Verkehr der Zukunft]
Electrical engineering tasks are analyzed on the basis of the state of rail-type transportation of today and tomorrow. [German]

Kill, E (Siemens) *Elektrotechnische Zeitschrift Ausgabe A* Vol. 94 No. 12, Dec. 1973

ACKNOWLEDGMENT: EI (EI 74 601024)
PURCHASE FROM: ESL Repr PC, Microfilm

11 057525
THE FUTURE ROLES FOR TRACKED LEVITATED VEHICLE SYSTEMS
The future roles for tracked levitated vehicle (TLV) systems are identified in the context of comparison with improved passenger rail systems and short haul air systems. These new TLV systems, anticipated to be available for operational use in the 1980's, will be capable of cruise speeds to about 300 mph, compared to 150-170 mph for high speed rail.

Contributed for publication by the Automatic Control Division.

Ward, JD (Department of Transportation) *ASME Journal of Dynamic Systems, Meas and Control* 74-Aut-T, June 1974, pp 117-127, 25 Fig., 26 Ref.

ACKNOWLEDGMENT: ASME Journal of Dynamic Systems, Meas and Control
PURCHASE FROM: ESL Repr. PC, Microfilm

11 057526
THE LATERAL DYNAMICS OF THE LINEAR INDUCTION MOTOR TEST VEHICLE
The dynamic behavior of the LIM Test vehicle has been the subject of theoretical and experimental studies conducted for the U.S. Department of Transportation by British Rail's Research and Development Division. Key aspects of the studies of lateral stability, curving and response to irregular track are described showing that an adequate stability margin exists for a conicity of 0.025. Satisfactory response characteristics are available for the anticipated roughness spectrum, but the linear curving regime does not encompass the higher range of operating speeds on the test track curve of 2.5 miles radius. To date (October 1973) measured performance compares well with theory but change of conicity with tire wear is an unexpected difficulty due in part to the very high track quality. This tire wear is of peculiar form and not typical of the normal high speed railway.

Contributed for publication by the Automatic Control Division.

Hobbs, AEW Pearce, TG *ASME Journal of Dynamic Systems, Meas and Control* 74-Aut-Q, June 1974, pp 147-157, 16 Fig., 6 Ref.

ACKNOWLEDGMENT: ASME Journal of Dynamic Systems, Meas and Control
PURCHASE FROM: ESL Repr. PC, Microfilm

11 057527
TRANSPORTATION VEHICLE/BEAM-ELEVATED GUIDEWAY DYNAMIC INTERACTIONS: A STATE-OF-THE-ART REVIEW
The importance of elevated guideway/vehicle dynamics to the design of advanced ground transportation systems is discussed and the general vehicle-suspension-guideway interaction problem is outlined. Simplifying assumptions valid for many practical beam-type elevated guideway systems are described including the Bernoulli-Euler beam assumptions, support conditions, and simplified vehicle models. The theoretical and experimental literature on beam-guideway/vehicle dynamics is reviewed and recent computer-based analytical techniques (lumped mass, finite difference and modal analysis) are discussed. Available simulation programs are described and published results for wheeled, air cushion and magnetically levitated vehicles operating over beam-elevated guideways are reviewed. The influences of critical system parameters on guideway deflection and vehicle vibrational acceleration (ride comfort) are illustrated through simple limiting case analyses. Low ratios of vehicle-suspension to guideway natural frequency and distribution of vehicle weight over finite pressure pads as in air or magnetic suspensions reduce guideway structural requirements for specified ride comfort. Continuous guideway beams on simple supports provide lower static deflection and greater dynamic range than simply supported single or multiple span beams. Severe resonance problems which may occur in synchronous vehicle systems are illustrated using a point-force vehicle model.

Contributed for publication by the Automatic Control Division.

Richardson, HH Wormley, DN (Massachusetts Institute of Technology) *ASME Journal of Dynamic Systems, Meas and Control* 74-Aut-P, June 1974, pp 169-179, 9 Fig., 73 Ref.

ACKNOWLEDGMENT: ASME Journal of Dynamic Systems, Meas and Control
PURCHASE FROM: ESL Repr. PC, Microfilm

11 057528
DYNAMIC INTERACTION ASPECTS OF CABLED-STAYED GUIDEWAYS FOR HIGH SPEED GROUND TRANSPORTATION
This paper describes the dynamic considerations in the design of a long span (200 to 600 ft) cable-stayed guideways for future tracked levitated vehicles (TLV's) which will be used for high speed ground transportation. A design approach is described in which a cable-stayed guideway structure can be synthesized to simulate the behavior of a beam on elastic foundation. This result is achieved by "cable-tuning" in which the cable stays are selected to achieve an equivalent uniform elastic foundation. The design approach insures that the live load deflection of the trackway beam is manifested as a traveling wave which moves horizontally at the same velocity as the vehicle, thereby minimizing dynamic interaction problems. Parametric results are presented for the dynamic response of a beam on elastic foundation. Optimum cable and tower configurations are developed for this quideway concept and a typical conceptual design is described.

Contributed for publication by the Automatic Control Division.

Meisenholder, SG (TRW Systems); Weidlinger, P (Weidlinger Associates) *ASME Journal of Dynamic Systems, Meas and Control* 74-Aut-R, June 1974, pp 180-192, 18 Fig., 1 Tab., 31 Ref.

ACKNOWLEDGMENT: ASME Journal of Dynamic Systems, Meas and Control
PURCHASE FROM: ESL Repr. PC, Microfilm

11 057562
ON THE OPERATION OF AUTOMATED GROUND TRANSPORTATION SYSTEMS, PART I: URBAN PROBLEMS AND PERSPECTIVES
The author presents and evaluates several approaches to the operation of automated ground transport systems for urban use. Since these systems have been suggested principally in response to urban traffic congestion problems and are often proposed as solutions to such problems, the author discusses in this paper (the first in a series of three) urban transportation problems and their origins. He identifies as principal elements the institutional structure, urban geography, and design of facilities for automotive transport. He suggests six potential applications for automated transport systems. These applications range from specialized single-link "horizontal elevators" to general-purpose wide-area networks.

Godfrey, MB *IEEE Transactions on Vehicular Technology* Vol. VT22 No. 1, Feb. 1973, pp 1-6, 24 Ref.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

11 057816
DYNAMIC STABILITY AND STRESS ANALYSIS OF ALTERNATIVE GUIDEWAYS FOR LEVITATION VEHICLES
Responses are predicted for several kinds of guideways subjected to the constant, transit pressures of levitation-type vehicles. The studies include: Stresses in subterranean tunnel liners with alternative vehicle support structures; comparative dynamic efficiencies of simple and two-span elevated guideways with several distributions of transit loads; dynamics of multiple, flexible post and rigid panel guidance walls; dynamics of segmented (open-jointed) guidance plates and of continuous plate strips with arbitrary foundation restraints; responses to transit moments of plate-type levitation surfaces on elastic foundations; and applications of these dy-

namic theories in determining stresses for alternative at-grade guideways of current importance.

Wilson, JF
Duke University Report Dec. 1973, 232 pp, 39 Ref.

Contract DOT-FR-30029

ACKNOWLEDGMENT: NTIS (PB-233643/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-233643/6, DOTL NTIS

11 057857
SUPERCONDUCTING MAGNET LEVITATION/PROPULSION TEST VEHICLE

This paper describes a research vehicle developed for the purpose of checking levitation characteristics, especially the dynamics of take-off and landing, when superconducting magnets are mounted right and left on the underside of the vehicle and, in opposition to them, track loops are installed on the ground; and for the purpose of studying the mutual influence between magnetic levitation and propulsion by a fixed stator type linear induction motor. A demonstration of this vehicle was staged as one of the events to celebrate Japan's railway centenary and the equipment for it was set in the compound of the Railway Technical Research Institute.

Usami, Y Kuzuu, T Fujie, J *Railway Technical Research Institute*
Quart. Rpt Vol. 15 No. 2, 1974, pp 62-68

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

11 057868
A STUDY OF THE EDDY CURRENT RAIL BRAKE

The eddy current rail brake can achieve a stable brake force without depending on adhesion between the rail and the wheel. Its weight does tend to become comparatively heavy. The authors measured the brake force/air gap characteristics and compared the measured value with the calculated value. As a result, the application of Maxwell's electro-magnetic equations was confirmed.

Aburaya, K Saito, T Shimizu, K *Railway Technical Research Institute*
Quart. Rpt Vol. 15 No. 2, 1974, pp 87-88

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

11 057922
CABTRACK STUDIES. OPERATION OF CABTRACK JUNCTIONS

Cabtrack is a proposal for a novel form of urban transport using small self-routing cabs operating under automatic control on a network of segregated tracks. The report, which is one of a series on Cabtrack studies, concentrates on methods of control and operation of junctions in the network. A variety of combinations of methods of queueing and of strategy at a merge are studied with the aid either of queueing theory or computer simulation. Comparisons are made and a preferred solution, the static queue, described. Brief mention is made of a computer simulation of a complete network using static queues at junctions.

Paddison, DI Catherall, D
Royal Aircraft Establishment Tech. Rpt. RAE-TR-72043, May 1972, 71p

ACKNOWLEDGMENT: NTIS (AD-781897/4)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-781897/4, DOTL NTIS

11 057923
ECONOMIC ASSESSMENT OF CABTRACK IN CENTRAL LONDON

An economic assessment has been made of four hypothetical Cabtrack systems in central London, including evaluation of social benefits. The most worthwhile system covers the City, West End, Victoria, Waterloo, Euston, Liverpool Street and Fenchurch Street, costs 47M to 67M pounds sterling to install and gives social returns of 9% to 12% with an average load of 1.5 passengers/cab to 17% to 22% with 2.35 passengers/cab. A larger system covering the whole Central Area would cost 82M to 134M pounds sterling, would carry about 35% more traffic and give social returns 2% to 4% lower than the small network. With a 75% capital grant the small network has sufficient surplus revenue to compensate LTE for losses due to the introduction of Cabtrack.

Mitchell, CGB
Royal Aircraft Establishment Tech. Rpt. RAE-TR-72040, May 1972, 79p

ACKNOWLEDGMENT: NTIS (AD-781898/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-781898/2, DOTL NTIS

11 057924
ESTIMATION OF TRAVEL PATTERNS AND COSTS FOR CABTRACK SYSTEMS IN CENTRAL LONDON AND BIRMINGHAM

The report describes hypothetical Cabtrack networks laid out in Central London and Birmingham. Estimates are made, on the basis of traffic survey statistics, of the likely travel demand in 1981 in the areas covered by these networks. In Central London the proportion of this travel demand assigned to the networks is based on percentage modal splits estimated for each type of trip. In Birmingham comparisons are made, for every trip recorded, of the relative attractiveness of travel by Cabtrack and by other modes of transport, and passengers are assumed to use Cabtrack if it is more attractive. On these assumptions loadings of all the cabstops and links of the networks are calculated. The costs of travel on the Cabtrack systems are then estimated. These seem reasonable, despite pessimistic assumptions as regards the operation of Cabtrack, and a probably over-optimistic view of the attractiveness of road transport in 1981.

Capey, EC
Royal Aircraft Establishment Tech. Rpt. RAE-TR-71128, June 1971, 82p

ACKNOWLEDGMENT: NTIS (AD-781900/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-781900/6, DOTL NTIS

11 057925
CABTRACK STUDIES. ESTIMATION OF CAPACITY OF CABSTOPS

Cabtrack is a proposal for a novel form of urban transport using small self-routing cabs operating under automatic control on a network of segregated tracks. The report, which is one of a series on Cabtrack studies, concentrates on one particular aspect, the operation of cabstops at which passengers board and alight from cabs. The majority of the report is concerned with a study of the layout, operation and capacity of Cabstops of a 'conventional' design in which cabs come to rest at specified points for passengers to get in and out at 'platforms'. Less conventional designs which have been studied appear to be inferior in capacity. Results are presented of a digital computer simulation of the operation of six small and medium-sized cabstops. Theoretical methods for estimated capacity are also described.

See also report dated Dec 68, AD-718 052.

Paddison, DI
Royal Aircraft Establishment Tech. Rpt. RAE-TR-71132, June 1971, 66p

ACKNOWLEDGMENT: NTIS (AD-781901/4)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-781901/4, DOTL NTIS

11 057926
CABTRACK STUDIES. TRAVEL PATTERNS AND COSTS FOR CABTRACK NETWORKS IN A SIMPLE MODEL SCENARIO

The estimated capital and operating costs of the fundamental Cabtrack network subsystems—cabs running on plain track, intersections, cabstops—are derived as a function of the traffic flows in these subsystems. The overall operating costs of a number of regular rectangular layouts of Cabtrack networks are then derived for the special case of an infinite network operating in a hypothetical scenario with a uniform travel density over its entire area. A method of optimising the mesh spacing is described, and examples given of the effect on costs of varying some of the trip-making parameters.

Langdon, MG Capey, EC Catherall, D
Royal Aircraft Establishment Tech. Rpt. RAE-TR-71138, July 1971, 129p

ACKNOWLEDGMENT: NTIS (AD-781902/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-781902/1, DOTL NTIS

11 057927
CABTRACK: COMMUNICATION AND CONTROL INSTRUMENTATION FOR A ONE-FIFTH SCALE TEST TRACK
Cabtrack is a proposed high-density urban transport system in which four-seat electrically powered vehicles run on a network of segregated tracks under automatic control. Passengers would be able, on demand, to travel non-stop between any two stations on the network. Feasibility studies were carried out and a new principle of position-lag slot control was proposed whereby vehicles would operate in synchronism with each other on main tracks, but change to asynchronous operation after diverting into a station loop. The model cabway has been successfully operated with six cabs of length 66 cm running at 2 m/s with headways of 54 cm (equivalent to a flow of 4000 cabs per hour on a track which is 70% occupied) thereby demonstrating a viable system of control which could be developed for use with various types of vehicle on segregated tracks.

Gibbs, EW Leedham, HC
Royal Aircraft Establishment Tech. Rpt. RAE-TR-73169, Mar. 1974, 45p

ACKNOWLEDGMENT: NTIS (AD-781907/1)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-781907/1, DOTL NTIS

11 057928
CABTRACK STUDIES: DATA SHEETS FOR TRACK LAYOUTS
The object of the report is to assist designers, architects or planners in laying out track for a Cabtrack network. The constraints governing curves and speed changes are discussed in terms of suggested maximum acceleration and jerk limitations. Figures and tables are given to show the minimum space required for curves, acceleration/deceleration lanes, sidesteps and vertical height changes. The effect of reducing speed past cabstops on the length of cabstops and system average speed is also discussed.

Longrigg, JCH
Massachusetts Institute of Technology Tech. Rpt. RAE-TR-71024, Feb. 1971, 40p

ACKNOWLEDGMENT: NTIS (AD-781896/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-781896/6, DOTL NTIS

11 071743
HIGH-SPEED GROUND TRANSPORTATION SYSTEMS ENGINEERING STUDY. SUSPENDED MONORAIL DYNAMIC STUDY
The report documents the results of work directed towards examining the potential for high speed operation of the Safege suspended monorail configuration. A three-dimensional multi-degree-of-freedom dynamic model of the vehicle is developed and tested under varying ride conditions. Systems parameters, such as cabin weight, damping rates, spring constants, etc., are varied in order to gauge their individual and combined effects on the vehicle's ability to meet specified ride comfort standards. A configuration capable of maintaining these standards at velocities of 150 mph is documented. (Author)
Report on High-Speed Ground Transportation Systems Engineering Study.

Dulock, VA Kreisberg, HN Plotkin, SE
TRW Systems Group, (06818-W011-RO-00) Final Rpt. FRA-RT-70-45, Dec. 1969, 89 pp

Contract C-353-66

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC
PB-194406, DOT NTIS

11 071764
SERVICE AND CAPACITY OF PEOPLE MOVER SYSTEMS
People mover systems are being advocated as solutions to a wide range of urban transportation problems, including internal circulation within activity centers. People movers are most applicable where trip demands are uniform without extreme peaks, and concentrationed at definitive node points well beyond acceptable walking distances. This type of trip pattern occurs at most airports and some activity centers but is not common within the typical central business district. Internal trip patterns within CBD's are comprised of many short multipurpose trips with high peaking characteristics and dispersed rather than concentrated desire lines. Trip patterns of this type are best accommodated by walking. Enhancement of pedestrianism within appropriate activity centers, by providing pedestrian only precints and grade-separated convenience networks are practical and viable alternatives for improving their internal circulation. Many cities are implementing programs of this type.

Fruin, JJ *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE3, 9942, Aug. 1973, pp 489-497

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

11 071790
CAISSONS SET FOR MAGNETIC TRAIN
Foundations for pillars to support the guideway of Ontario's experimental urban transit line are nearing completion. The primary foundation work involves installation of 481 caissons to support the 225 precast columns that carry the elevated guideway. The unlined caissons, also augered 2 feet into the bedrock have been straightforward for the most part. The main difference at these locations is the size of the reinforcing cage.

Jones, B *Engineering and Contract Record* Vol. 87 No. 5, May 1974

ACKNOWLEDGMENT: EI (EI 74 802883)
PURCHASE FROM: ESL Repr PC, Microfilm

11 071801
TRANSURBAN SYSTEM
The design of new urban transportation systems must take many factors into consideration, including passenger comfort and safety, reliability and cost of service, economy of operation and installation, integration with existing modes of transportation, varying capacity requirements during peak and off-peak hours, need for low exhaust and noise pollution, and compatibility with a city's character. This paper describes one system which tries to meet these requirements, the Transurban system developed by Krauss-Maffei. Use of 12-passenger vehicles enables the make up of varying train lengths to meet fluctuating demand up to about 15,000 passengers/h. The vehicles are elevated and powered by electromagnets controlled by an electronic system and propelled by linear induction motors.

Rieser, E
Society of Automotive Engineers Preprint N740144

ACKNOWLEDGMENT: EI (EI 74 805718)
PURCHASE FROM: ESL Repr PC, Microfilm

11 071807
COMPARISON OF PERSONALIZED RAPID TRANSIT AND CONVENTIONAL SYSTEMS IN A PEOPLE-MOVER APPLICATION
As one part of a study to determine economic and design feasibility of developing a people-mover system in Downtown Minneapolis, a comprehensive comparison of new technology (including Personalized Rapid Transit-PRT) and conventional system alternatives was made. This study included a comparison of level of service, technology required, compatibility with the existing area, economics of the system, and impact on the environment. This paper presents the part of the study that compared systems in terms of potential passenger service and compatibility with the existing area. In terms of compatibility, the major emphasis is on the visual impact of an aerial guideway system within a downtown area.

Anderson, PA (Honeywell Incorporated) *Honeywell Computer Journal* Vol. 7 No. 4, 1973, pp 219-227, 2 Ref.

ACKNOWLEDGMENT: EI (EI 74 700715)
PURCHASE FROM: ESL Repr PC, Microfilm

11 071825
CONTROL OF A CONVEYANCE FOR BULK MATERIALS THAT IS DRIVEN BY ELECTRIC LINEAR MOTORS [Steuerung eines Massengut-Transportmittels mit Linearmotor-Antrieb]
Concept of a transportation system for bulk materials, whose economics would lay between those of railroad and band conveyor, is discussed. It consists of two, suspended monorail tracks, one for the load and another empty return, which are arranged one over the other in a vertical plane. The problem of control analyses: number of trains in simultaneous opera-

tion as well as the arrangement of cams (stators) for the linear motors. In case of multiple trains operation the positioning of the cams (stators) on the track structure provides for optimum control conditions. [German]

Augenrecih, K *Foerdern und Heben* Vol. 24 No. 6, Apr. 1974

ACKNOWLEDGMENT: EI (EI 74 707189)
PURCHASE FROM: ESL Repr PC, Microfilm

11 071826
APPLICATION OF SPACE TECHNOLOGY TO GROUND TRANSPORTATION
This paper reviews the ways in which devices, technology, and operational management techniques developed in the course of the space program are being used in present operations and in the research and development of future systems. The use in systems for freight movement and passenger movement is discussed. The factors which currently limit their utilization are also treated.

Klein, M *Advances in the Astronautical Sciences* Vol. 30 June 1973

ACKNOWLEDGMENT: EI (EI 74 707357)
PURCHASE FROM: ESL Repr PC, Microfilm

11 071847
FINAL DESIGN OF AN AT-GRADE GUIDEWAY FOR THE TRACKED AIR CUSHION RESEARCH VEHICLE
This report describes the final design for an at-grade guideway for the 300 mph Tracked Air Cushion Research Vehicle (TACRV). Detailed drawings and specifications have been developed for this design so that it can be constructed at the DOT High Speed Ground Test Center which is located near Pueblo, Colorado. Present plans are to extend the presently constructed 3 miles of guideway by use of the TRW/ABAM design for the next construction segment. Reductions in the structural cost of the guideway of 20-30% have been predicted. The guideway described in this report uses a continuously reinforced concrete pavement slab for the horizontal levitation surface and precast concrete panels for the vertical guidance surface. The guidance panels are attached to the slab by steel I-beams. This report summarizes the design features, design constraints, critical loads and cost estimates for this guideway structure. Also described are construction considerations and requirements for the foundation. Theoretical models and results of the static and dynamic analyses are described in appendices.

Magura, DD Cichanski, WJ Meisenholder, SG
TRW Systems Group, Federal Railroad Administration Final Rpt. 96030-L014-0, Nov. 1973, 144 pp

Contract DOT-TSC-442

ACKNOWLEDGMENT: NTIS (PB-234814/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-234814/2, DOTL NTIS

11 071959
THE LINEAR MOTOR AND ITS FUTURE IN HIGH SPEED LAND TRANSPORT
The use of the linear motor as a means of propulsion for land vehicles at very high speed has so far given rise to considerable controversy with regard to the adequacy and supposed limits of this new motor. In particular, the so-called extremity effects have been the subject of different appraisals with regard to their influence on the performance of the locomotive, none of which consider that these effects are likely to affect its future in the field of high speeds. The work carried out in association with the "Societe Le Moteur Lineaire" at Grenoble has convinced the author that the knowledge of these phenomena acquired so far is not such to condemn this technique, but rather is the contrary the case. Despite the importance of the speed of synchronism on interference phenomena, a drop in performance of the motor does not necessarily follow the increase in this speed.

Bompa, L *Rail International* No. 6, June 1974, pp 411-413, 6 Fig., 3 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072005
TRACKED TRANSPORT SYSTEMS OF THE FUTURE: STATE-OF-THE-ART AND DEVELOPMENT IN EUROPE IN 1973 [Spurgebundene Verkehrssysteme der Zukunft Stand und Entwicklung in Europa 1973]
The report gives an overview of the existing tracked transport systems and of the techniques available. It outlines the state of development of technical components. It reviews planning and research in Germany and in 15 other European nations and also studies undertaken by European and international organizations. The report concludes that by the end of the century a tracked high efficiency rapid transport system will be an economic and social necessity in Europe. Such a system could be based on several technical solutions, specifically on the wheel-on-track system, air cushion or magnetic levitation. It is very important that European nations collaborate rather than compete in the research for the best technical and economical solutions. Planning should start immediately for the anticipated future European structure of population and economy. The network for a future high efficiency rapid transport system should be determined. Projections for passenger and freight transport in such a network should be made and speed limits should be determined. [German]

Ministry of Transport, West Germany A8/16.50.10-F, Oct. 1973, 45 pp

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Ministry of Transport, West Germany Bundesminister fuer Verkehr (BMV), Bonn, West Germany Repr. PC

11 072498
A QUANTITATIVE ANALYSIS OF SYNCHRONOUS VS. QUASI-SYNCHRONOUS NETWORK OPERATIONS OF DUAL-MODE AND PRT SYSTEMS
This paper investigates the performance of the synchronous and quasi-synchronous network control policies proposed for area-wide high capacity Dual-Mode and Personal Rapid Transit systems. Performance is analyzed from the user point-of-view in terms of the expected travel time delay associated with each policy. Using an idealization of the network layout and uniform demand for service, analytic expressions for the expected delay are derived for each policy in terms of fundamental parameters (line spacing, trip rate, trip length distribution, maneuver region). Comparisons of the performance of each policy are presented in parametric form.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Kornhauser, AL McEvaddy, PJ (Princeton University)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A) Proceeding Part II, 1974, pp 735-748, 13 Fig., 11 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072499
PERSONAL RAPID TRANSIT SYSTEMS
Starting with the Urban Mass Transportation Act of 1964, the federal government has sponsored development of transportation alternatives to the automobile in dispersed metropolitan areas, systems which have come to be known as Personal Rapid Transit. This paper discusses the PRT programs of the Urban Mass Transportation Administration, system design requirements as identified in the various studies, PRT performance specifications (including capacity, and speed), and the major subsystems—suspension/ propulsion/guideway and command/control. The author concludes that many configurations need to be examined in arriving at optimum designs.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Blood, B (Transportation Systems Center)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A) Proceeding Part II, 1974, pp 729-733, 3 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072500
PROPULSION REQUIREMENTS FOR HIGH SPEED VEHICLES WITH ELECTRODYNAMIC SUSPENSION
The thrust force and power requirements for the propulsion of a vehicle with electrodynamic suspension (i.e. using superconducting magnets) are discussed. Acceleration thrust, magnetic drag and aerodynamic drag are shown to lead to calculated power requirements of 8.0 MW under acceleration, and 5.2 MW for cruising at 300 mph. Aerodynamic and magnetic drag forces together produce acceptable passive deceleration characteristics. Propulsion requirements under normal operation and in emergency situations (i.e. unscheduled stops) are described. Propulsion systems are discussed, and it is concluded that the linear synchronous motor is most suitable for the proposed Maglev vehicle.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Atherton, DL Eastham, AR (Queen's University, Canada)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A) Proceeding Part II, 1974, pp 695-700, 8 Fig., 6 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072501
THE APPLICATION OF LEVITATED VEHICLES TO URBAN RAPID TRANSIT
It is generally conceded that transportation looms large in any list of problems affecting our major urban areas. As we search for solutions to such problems, it appears that rapid transit will be called upon to play an increasing role. With the growth in rapid transit construction and expansion, a variety of new systems and system proposals has followed. Of the many types, the levitated vehicle system (LVS) has substantial advantages because of the reduced weight resulting from the elimination of wheels, trucks, and axles. This paper examines these levitated systems in more detail, and explores the advantages and disadvantages they may have in urban rapid transit service.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Miller, DR Sulkin, MA Holden, WHT (Daniel, Mann, Johnson, Mendenhall)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A) Proceeding Part II, 1974, pp 701-723, 14 Fig., 9 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072661
MULTIPLE AND CONTINUOUS SPAN ELEVATED GUIDEWAY-VEHICLE DYNAMIC PERFORMANCE
Analyses are developed to determine the dynamic performance of vehicles interacting with single, multiple, and continuous span elevated structures. Operating conditions in which multispan resonant conditions occur are identified, and the resulting resonant amplitudes computed. Guideway design examples considering tracked, levitated vehicles are described to illustrate the influence of span configuration and vehicle speed and suspension properties upon guideway span design for vehicle-guideway systems required to provide specified passenger comfort levels. For the 150 and 300 mph (242 and 483 km/h) vehicle systems considered, continuous and multispan guideway configurations were found to have reduced span material requirements in comparison to single span systems which provide the same level of passenger comfort.

This paper was contributed by the Automatic Control Division of the ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Smith, CC Gilchrist, AJ (Texas University, Austin); Wormley, DN (Massachusetts Institute of Technology)
American Society of Mechanical Engineers No. 74-WA/AUT-4, Feb. 1974, 11 pp, 29 Ref., 1 App.

PURCHASE FROM: ASME Repr. PC

11 072662
RESPONSE OF CONTINUOUS PERIODICALLY SUPPORTED GUIDEWAY BEAMS TO TRAVELING VEHICLE LOADS
The response of continuous span periodically supported guideway beams to traveling vehicle loads is determined using Fourier transform techniques. Vehicle loads are assumed to travel at constant speed with constant magnitude and may be spacially concentrated or distributed to represented wheeled, air cushion, or magnetic suspension vehicles. Guideway dynamic amplification factors and deflection profiles are presented in detail for the single concentrated traveling load. Operating regions in which dynamic resonance conditions occur are identified, and the influence of span damping is evaluated. Guidelines for the formulation of finite span approximations to the infinite continuous span guideway are also developed.

This paper was contributed by the Automatic Control Division of ASME for presentation at the Winter Annual Meeting, 17-22 November 1974, New York, New York.

Smith, CC (Texas University, Austin); Wormley, DN (Massachusetts Institute of Technology)
American Society of Mechanical Engineers No. 74-WA/AUT-3, Feb. 1974, 9 pp, 10 Fig., 11 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

11 072663
MINIMUM VEHICLE—GUIDEWAY CLEARANCES BASED ON A CONTACT FREQUENCY CRITERION
An important consideration in the design of air cushion and magnetic suspensions is the power required to suspend or levitate the vehicle in equilibrium. Since this power level increases with an increase in the equilibrium clearance between the base of the suspension and the guideway, it is desirable to keep the design clearance as small as possible.

This paper was contributed by the Automatic Control Division of the ASME for publication in the Journal of Dynamic Systems, measurements, and control.

Hullender, DA (Texas University, Arlington)
American Society of Mechanical Engineers No. 74-Aut-L, Jan. 1974, 11 pp, 5 Fig., 1 Tab., 11 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

11 072664
ANALYSIS, DESIGN, AND OPTIMIZATION OF HIGH SPEED VEHICLE SUSPENSIONS USING STATE VARIABLE TECHNIQUES
This article applies state variable techniques to high speed vehicle suspension design. When a reasonably complex suspension model is treated, the greater adaptability of state variable techniques to digital computer application makes it more attractive than the commonly used integral transform method. A vehicle suspension model is developed, state variable techniques are applied, numerical methods are presented, and, finally, an optimization algorithm is chosen to select suspension parameters. A fairly complete bibliography is included in each of these areas. The state variable technique is illustrated in the solution of two suspension optimization problems. First, the vertical plane suspension of a high speed vehicle subject to guideway and aerodynamic inputs will be analyzed. The vehicle model, including primary and secondary suspension systems, and subject to both heave and pitch motions, has thirteen state variables. Second, the horizontal plane suspension of a high speed vehicle subject to guideway and lateral aerodynamic inputs is analyzed. This model also has thirteen state variables. The suspension parameters of both these models are optimized. Numerical results are presented for a representative vehicle, showing time response, mean square values, optimized suspension parameters, system eigenvalues, and acceleration spectral densities.

This paper was contributed by the Automatic Control Division of the ASME for publication in the Journal of Dynamic Systems, Measurement, and Control.

Hedrick, JK Billington, GF Dreesbach, DA (Arizona State University)
American Society of Mechanical Engineers No. 74-Aut-K, Jan. 1974, 11 pp, 6 Fig., 5 Tab., 20 Ref., 1 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

11 072688
INVESTIGATION OF REDUCED COST GUIDEWAY DESIGNS FOR THE TRACKED AIR CUSHION RESEARCH VEHICLE. PART A
A study was made of alternate low cost guideway design concepts for the 300 mph Tracked Air Cushion Research Vehicle which will be tested at the DOT High Speed Ground Test Center at Pueblo, Colorado. The proposed concepts are both within present state of the art, and are designed to take maximum advantage of the existing technology used in the highway construction industry. The chief requirements are low construction cost and safe operation of vehicles at speeds up to 300 miles per hour. The various guideway design constraints imposed by the vehicle are discussed and used to evolve the preferred design concepts. The requirement for acceptable passenger ride comfort is interpreted in terms of guideway surface smoothness considerations by means of a probabilistic analysis of vehicle response. Various construction techniques are investigated and cost estimates are presented for each of the preferred concepts. The costs of the two preferred quideway design concepts are compared to the cost of the existing design which is being used for the initial construction phases at HSGTC. The sensitivity of the construction cost to certain guideway design features is discussed. Estimates showed that the tow preferred concepts should cost 30-50% less than the existing design.

Research was done jointly by ABAM Engineers and TRW Systems. The work was sponsored by the Department of Transportation, Transportation Systems Center, Cambridge, Massachusetts.

Birkeland, PW McCullough, BF Meisenholder, SG Oye, J
TRW Systems Group, (96030-L003-0) FRA-ORD&D-74-55, Dec. 1972, 230 pp, Figs., 7 Tab., 4 App.

Contract DOT-TSC-442

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-235123/7SL, DOTL NTIS

11 072689
AN EVALUATION OF THE DYNAMICS OF A MAGNETICALLY LEVITATED VEHICLE
An analytical and experimental evaluation was made of the stability and dynamic characteristics of a small scale magnetically levitated vehicle. The vehicle was levitated over a variety of guideway perturbations in an attempt at stimulating unstable modes of oscillation. No instabilities developed in the five degrees of freedom measured using either passive or active damping. The analytical model was used to simulate the observed motions of the vehicle using a computer. Reasonable agreement was found although more damping was observed than was simulated using the model. This work was performed as a part of the Federal Railroad Administration's program of research and development on high speed ground transportation for use in intercity passenger service.

Related reports are NTIS PB-221696, Study of a Magnetically Levitated Vehicle, and NTIS PB-210505, The Feasibility of Magnetically Levitating High Speed Ground Vehicles. Research was sponsored by Federal Railroad Administration, office of Research Development and Demonstration.

Coffey, HT Colton, JD
Stanford Research Institute, (No. 1080) Final Rpt FRA-ORD&D-74-41, Mar. 1974, 160 pp, 75 Fig., 4 Tab., 8 Ref., 2 App.

Contract DOT-FR-10001

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-236671, DOTL NTIS

11 072695
PLATOON-OPERATED STATIONS FOR QUASI-SYNCHRONOUS PERSONAL RAPID TRANSIT NETWORKS
A computer simulation of vehicle in off-line, single-ramp personal rapid transit station is presented. Previous to entering the station, the vehicles form platoons in a queue area. The vehicles are assumed to leave the station in platoons and enter another queue area to await open slots for merging onto the main line. The independent variables of the simulation are the station throughput, flow rate on the main line, number of vehicles berths in the queue areas, and number of berths in the station. The dependent variables are the abort rate and time delays in the queue area. The main results of interest to station designers are curves relating throughput to the total number of berths in the station and queue area. Curves corresponding to 0.5 and 1 per cent abort rates are exhibited.

Dais, JL (Bell Laboratories); York, HL *Transportation Research* Vol. 8 No. 1, Feb. 1974, pp 63-70, 17 Ref.

ACKNOWLEDGMENT: EI (EI 74 065267)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072707
EDDY CURRENT DISTRIBUTION AND LIFT FORCE FOR FINITE MAGLEV STRIPS
The transverse distribution of induced eddy currents across a flat conducting strip of finite width, due to a rectangular d.c. magnet moving above it, has been modeled experimentally, and has been compared with that calculated for an infinite sheet. The electrodynamic suspension is simulated by means of a stationary a.c.-excited copper magnet suspended above an aluminum strip, and the induced surface current density is measured by a voltage pickup probe connected to a lock-in amplifier. Good agreement is obtained between the eddy current profiles for a wide sheet and those calculated by determining the current distribution required to cancel the vertical component of the magnetic field at the surface of the sheet. The effect of reducing strip width is examined and shown to produce high current densities close to the edges. These results are related to the variation of lift force with strip width, determined by impedance modeling. A slight enhancement of life is evident for intermediate strip widths.

Atherton, DL (Queen's University, Canada); Eastham, AR Fombrun, C Chong, M *Canadian Journal of Physics* Vol. 52 No. 13, July 1974, pp 1203-08, 4 Ref.

ACKNOWLEDGMENT: EI (EI 74 065261)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072708
ELECTRIC LINEAR MOTOR URBAN TRANSPORTATION SYSTEM
An urban transportation system is outlined which is based on linear motor-driven electromagnetically suspended vehicles. A parallel connected linear motor is described that permits speed control and other unique operating features for the system as a whole.

Lamb, C *Electrical Engineer* Vol. 51 No. 1, Jan. 1974, pp 6-8

ACKNOWLEDGMENT: EI (EI 74 065260)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072783
MEASURING AND CONTROL SYSTEM FOR TESTING NEW COMPONENTS FOR GUIDED TRANSPORT SYSTEMS EMPLOYING MAGNETIC LEVITATION [Mess und Leitsystem fuer die Erprobung Neuartiger Komponenten fuer Magnetschwebebahnen]
A test track has been built in Erlangen for the long-time testing of future high-velocity guided transport systems systems employing magnetic levitation. A general description of the test track is followed by details of the measuring and control system. Reference is made to the work planned for the large testing installation at Donauried. [German]

Mandt, K *Siemens Review* Vol. 48 No. 8, Aug. 1974, pp 519-525

ACKNOWLEDGMENT: EI (EI 74 069535)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 072854
AEROSPACE INVESTORS ARE TAKEN FOR A RIDE
In the late 1960s several US aerospace companies diversified into ground transport, an area where it seemed that high-powered research and development would quickly satisfy a vast market for innovative technology. A stockbroker has analysed the financial results and comments in annual reports of the companies concerned.

Railway Gazette International Vol. 130 No. 10, Oct. 1974, pp 389-392, 4 Phot.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

11 072855
LINEAR MOTORS TO POWER DOT'S HIGH-SPEED RESEARCH VEHICLES
Linear electric machines are generally considered indispensable for the propulsion of tracked vehicles at 400 km/h and above, As part of the US Department of Transportation's research program at Pueblo, two multi-megawatt LIM propulsion systems have been built by Garrett for rail and levitated vehicles. The former reached a maximum speed of 410 km/h on August 14 with jet assistance.

Kalman, G (AiResearch Manufacturing Company) *Railway Gazette International* Vol. 130 No. 10, Oct. 1974, pp 378-383, 5 Fig., 4 Phot., 13 Ref.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

11 072856
NEW TRANSIT TECHNOLOGIES: AN OBJECTIVE ANALYSIS IS OVERDUE
New urban transit systems incorporating inefficient and obsolete technical features are being promoted, discussed and funded. Typically they involve automatic operation with rubber tire guidance; rail systems which are clearly superior are concurrently ignored. The authors urge transit planners, operators and equipment manufacturers to exploit the great potential of rail technology rather than pursuing innovation for its own sake.

Railway Gazette International Vol. 130 No. 10, Oct. 1974, pp 384-387, 1 Fig., 1 Tab., 7 Ref.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

11 072857
LEVITATION LINE-UP 1974
With a concensus emerging that puts the upper limit of rail speeds at 300 km/h for economic and commercial rather that strictly technical reasons, there has recently been a considerable re-grouping and consolidation of research effort into tracked levitated transport aimed at meeting the need for movement between cities up to 1 500 km apart at maximum speeds of around 500 km/h. Most notable has been the decline of air-cushions in favour of magnetic levitation.

Railway Gazette International Vol. 130 No. 10, Oct. 1974, p 377, 5 Phot.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

11 072955
LATEST DEVELOPMENTS AFFECTING MAGNETIC LEVITATION VEHICLES
Prompted by the hope that a novel high-speed ground transportation mode might permit speeds up to 500 kph, worldwide research has more and more concentrated on contact-free track-guided levitation techniques, especially since technical advances have been made in control techniques and data processing. In the German Federal Republic, activities are mainly concentrated on magnetic levitation with groups separately working on electro-dynamic suspension and on electromagnetic suspension techniques. The principles have been shown applicable to railway-type operations. There are still a multitude of problems to be solved. Railways should continue to promote the wheel-on-rail technology, it was concluded.

Lehmann, H (German Federal Railway) *Rail International* No. 10, Oct. 1974, pp 629-637, 6 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

11 080044
ROLE OF PERSONAL RAPID TRANSIT IN MASS TRANSIT
With the nation looking more and more to mass transit to solve its urban transportation problems, the innovative Personal Rapid Transit (PRT) systems with their "second car" characteristics can be expected to complement bus and rail services, especially in medium-density population areas. After summarizing the role each of these three forms of public transit plays and is projected to play by 1990, the paper describes current specialized PRT applications in the United States and abroad.
This paper was prepared for a meeting 12-16 August 1974.

Lancaster, TA (Rohr Industries, Incorporated); Hearn, DL
Society of Automotive Engineers Preprint N 740623, 1974, 10 pp

ACKNOWLEDGMENT: EI (EI 74065264)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080045
PERSONAL RAPID TRANSIT (PRT) SYSTEM FOR LAS VEGAS, NEVADA
Las Vegas, Nevada is one of the ideal urban environments for a Personal Rapid Transit (PRT) System. The city operates on a "round the clock" basis and highway traffic congestion is becoming severe with the growth of tourism. The principal industry is tourism and a fare structure can be imposed which will made a PRT system self-supporting. A PRT system is described which meets the anticipated Las Vegas requirements of 24h/day operation, vehicle and service being designed to compete favorably with the automobile. The PRT system elements described include vehicle, guideway, control features, stations, and maintenance facility. The results of a maintenance plan analysis and financial considerations are also discussed.
This paper was prepared for a meeting 12-16 August 1974.

Hoit, WJ (Monocab Incorporated); Corey, RW
Society of Automotive Engineers Preprint N 740625, 1974, 19 pp

ACKNOWLEDGMENT: EI (EI 74 065266)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080046
ADVANCED SYSTEMS AVAILABLE NOW
The steady decline of mass transit systems in the United States has led to a critical condition which is destined to become much worse before it improves. Only mass transit systems offer real solutions to cities' problems of congestion, pollution, energy consumption and fatalities. Modern transportation systems are available now to cope with the problem.
IEEE Electron and Aerospace System Conv, Rec, Washington, D.C., 17-19 September 1973.

Beck, NJ (Rohr Industries, Incorporated)
Institute of Electrical and Electronics Engineers 73 CHO 783-1 AES, 1973, pp 66-72

ACKNOWLEDGMENT: EI (EI 74 065258)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080088
CALCULATION OF OPTIMAL TRAIN PERFORMANCE CURVES IN THE UHSGT
While the so-Called Ultra High Speed Ground Transportation System has been studied in many countries, the Japanese National Railways has produced a method of computing optimal train performance curves for UHSGT using dynamic programming. Passenger comfort and energy to be consumed in running a train are the criteria for the optimal condition.

Yasukawa, S Todoriki, M *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 160-161, 3 Fig.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

11 080097
THE SYNCHRONOUS MOVING-CELL CONTROL PHILOSOPHY FOR AUTOMATED TRANSPORTATION SYSTEMS
One of the major factors influencing the capacity of any mode of transport is the degree of control that can be exerted over individual vehicles. For this reason, a system of discrete driverless vehicles travelling on a network of automated single-lane guideways, is seen by many as one possible solution to the problem of congestion in densely populated urban areas. In this paper, therefore, the authors discuss the benefits and limitations of the synchronous moving-cell control philosophy that has been developed in recent years as a method of controlling vehicles in such automated systems. The problems of controlling a stream of vehicles, both on an automated main-line guideway and at a merge point, are examined in detail

and the advantages of the synchronous moving-cell concept over alternative control schemes are illustrated. Finally, the authors consider some of the practical problems which would arise when implementing such a scheme.

Rumsey, AF Pwner, ET (Manchester University Inst of Sci & Tech, England) *Transportation Planning and Technology* Vol. 2 No. 3, 1974, pp 157-164, 6 Fig., 21 Ref.

ACKNOWLEDGMENT: Transportation Planning and Technology
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080218
DISPOSITION OF EMPTY VEHICLES IN A PERSONAL RAPID TRANSPORTATION
A basic vehicle management function, associated with operation of a Personal Rapid Transit (PRT) System, is that of continually redistributing empty vehicles throughout the system. In this report a procedure for performing this function is developed and evaluated. The procedure, carried out periodically (e.g. every few minutes) consists of three steps: (a) estimation of the surplus or deficit of empty vehicles at each station; (b) allocation of surpluses to deficits; and (c) preparation of a dispatch list for each station, based on the allocations, the list giving the disposition of successive empty vehicles as they become available. Two computer simulations were constructed to evaluate the procedure. Simulation runs demonstrated that the procedure worked well.

Waddell, MC Williams, MB Ford, BM
Johns Hopkins University, Silver Spring, Urban Mass Transportation Administration Final Rpt. APL/JHU-TPR-028, May 1974, 132 pp

Contract DOT-UT-30010

ACKNOWLEDGMENT: NTIS (PB-236015/4SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236015/4SL, DOTL NTIS

11 080306
HEURISTIC SCHEDULING PROCEDURES FOR PRT SYSTEM
While rapid transit systems have been suggested as alternatives to our automobile clogged cities, they have faced a problem in providing passengers with the type of service that they expect from their automobile. In an effort to provide for a rapid transit system that offers the advantages of the automobile but has greater capacity, the Morgantown Personal Rapid Transit System was conceived. A Personal Rapid Transit (PRT) system is characterized by relatively small vehicles that provide direct station to station travel without intervening stops. Service is essentially provided on demand much the same way as an elevator operates. In order to compete with the automobile, the PRT must be operated as efficiently as possible in order to keep passenger waiting time to a minimum. This paper is concerned with the development of efficient scheduling algorithms which will keep passenger waiting times at an acceptable level while providing for efficient usage of the system. Before examining these procedures, a brief description of the Morgantown PRT system will be given.

Esposito, PR Byrd, J, Jr (West Virginia University) *ASCE Journal of Transportation Engineering* Vol. 100 No. TE4, Nov. 1974, pp 845-853, 2 Fig., 5 Tab., 7 Ref.

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080345
EDGE EFFECTS IN THE END ZONES OF LINEAR RAILWAY MOTORS AT VERY HIGH SPEEDS AND THEIR INFLUENCE ON THE PERFORMANCE OF THE MOTORS [Die Randeffekte der Endzonen von Linearbahnmotoren be Sehr Hohen Geschwindigkeiten und Ihr Einfluss auf das Betriebsverhalten Dieser Motoren]
The effect of speed on the traction capacity of a linear motor with constant consumption of electric power is studied on the basis of experimental investigations. The causes of the decline in the traction capacity with increasing speed are analyzed. It is found that the longitudinal edge effect and the increase in the reactance of the induction winding, due to the increased air gap, play the main role in this respect. The experimental results are compared with the findings of Japanese scientists. [German]

Skobelev, VE (Leningrad Polytechnical Institute); Solojew, H Epitfanow, A *Wissenschaftliche Zeitscherift Tech Univ Dresden* Vol. 23 No. 2, 1974, pp 375-383

ACKNOWLEDGMENT: EI (EI 74 076745)
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080776
STATISTICAL GROUND EXCITATION MODELS FOR HIGH SPEED VEHICLE DYNAMIC ANALYSIS
The method used to statistically describe a digitally defined ground roughness profile, based on measured data, is outlined and illustrated by reduction of the survey data of the Tracked Levitated Research Vehicle's (TLRV) Initial guideway section. The power spectral density (PSD) is the statistic of prime interest. Its use as the ground roughness excitation function in linear vehicle dynamic response analyses provides, the impetus. The PSD is not unique; therefore, when calculated for use in such analyses, the vehicle speed and suspension natural frequencies become critical parameters. The statistical estimates of the PSD and autocorrelation (AC) functions based on this TLRV data indicate a reasonable fit with mathematical models which consist of Fourier transform pairs. These PSD models contain less energy at low frequencies than the model presently used. A first-order vehicle dynamic response analysis incorporating one of these models results in substantial reductions of suspension stroke response. The roughness coefficient (A) of this section of thw TLRV guideway is approximately 1.2 x 10 to the minus 6th power feet-radians.

Sussman, NE (Mitre Corporation) *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 145-154, 11 Fig., 1 Tab., 7 Ref.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080779
AN EXPERIMENTAL INVESTIGATION OF PNEUMATIC TUBE VEHICLE SYSTEMS
The work presented in this paper is an experimental and analytical investigation of the performance of pneumatic tube vehicle systems. The experimental facility that was built is described. The effect of vehicle density, length, frontal shape, surface preparation, blockage ratio, and tube initial pressure on vehicle performance and tube pressure history was investigated, using data from the experimental facility. An analytical model, which assumed instantaneous polytropic expansion behind and compression in front of a vehicle as it travels down the tube, was developed. Reasonable agreement was found between the predictions of the analytical model and data generated by the experimental facility. Several conclusions based on the initial experimental data are made and the results were used to develop an analytical model for simulation of the full scale systems.

Woodbury, CA, III (Klauder (Louis T) and Associates); Goss, WP McGowan, JG (Massachusetts University, Amherst) *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 155-165, 5 Fig., 1 Tab., 5 Ref.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080780
THE DESIGN OF A RAM WING VEHICLE FOR HIGH SPEED GROUND TRANSPORTATION
A system design of a ram-wing vehicle for high speed ground transportation is carried out. A feasibility study using one-dimensional channel flow theory with leakage is developed along with lift and drag laws for low aspect ratio ram wings side plates. Based on requirements chosen for an operational system, subsystems are evaluated and integrated into a functional system developed around a 72-passenger vehicle capable of crusing at 300 mph. A test program and an implementation schedule are proposed. Total research and investment costs are estimated for a system for the Northeast corridor.

Tan, EA (Du Pont de Nemours (EI) and Company, Incorporated); Goss, WP Cromack, DE (Massachusetts University, Amherst) *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 167-183, 5 Fig., 4 Tab., 8 Ref.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

11 080781
AERODYNAMICS OF VEHICLES IN FINITE LENGTH TUBES
High speed vehicles may operate in tunnels or tubes to minimize impact on the surrounding environment. Operation in tunnels or tubes minimizes the impact of surface obstacles, high noise levels, weather constraints and

street congestion in metropolitan areas. The performance of these vehicles is significantly affected by the aerodynamics and needs to be understood. The aerodynamics of vehicles traveling through tubes are significantly affected by the constraints of the tube wall and the relative size (blockage ratio) of the vehicle. Steady flow conditions are reached only after long travel times. In this report, the flow created by vehicle travel in a tube is analyzed using numerical integration of the unsteady flow equations. Steady state conditions are rarely obtained for closed-end tubes up to several hundred miles in length. Solutions are presented for various blockage ratio vehicles with choked and unchoked flow conditions about them. Various tube lengths are also considered. The solution for a doubly infinite tube is found to be approaching the asymptotic long time solution.

This document was prepared for the Federal Railroad Administration, DOT.

Hammitt, AG
TRW Transportation and Environmental Operations, (96034-L014-0) Final Rpt. FRA-ORD&D-74-10, Apr. 1974, 86 pp

Contract DOT-FR-30004

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236692, DOTL NTIS

11 080883
DESIGN, DEVELOPMENT AND TEST OF A WAYSIDE POWER DISTRIBUTION AND COLLECTION SYSTEM FOR THE TRACKED LEVITATED RESEARCH VEHICLE

This document presents test activity description and results of the wayside power distribution and collection system designed for the TLRV, a high-speed ground transportation vehicle. The system was assembled at the U.S. Navy testing grounds, China Lake, California to prove the design concept and feasibility of transferring high-electrical power between rail and collector brushes at elevated speeds while subjected to prevailing environmental conditions. With minor modifications, the initial design conformed to specified requirements up to speeds in excess of 300 mph. Analysis of the rail configuration and test results indicated that distance between the wayside rail supports could be doubled (25 ft) lessening by half the number of supports required to maintain the rail's alignment integrity at design speeds. Installation of the wayside rail system at HSGTC, Pueblo, Colorado will be constructed using the 25 ft span configuration.

This document was prepared for the Office of High Speed Ground Transportation, Federal Railroad Administration, DOT.

Webster, JO Shapiro, H Guenther, C Kalman, G Clemence, J Mitchel, S
AiResearch Manufacturing Company, (73-9436) Final Rpt. FRA/ORD&D74-25, Apr. 1974, 200 pp, Figs., Tabs.

Contract DOT-FR-10002

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
FRA/ORD&D74-25, DOTL NTIS

11 080884
CABLE-STAYED GUIDEWAY—ANALYSIS AND DYNAMIC MODEL TESTS

This report presents the results of scale model tests and parametric structural analyses which were performed in support of a conceptual investigation of cable-stayed guideways for suspended vehicle systems (SVS). The SVS concept would use high speed ground transportation (HSGT) vehicles suspended from an overhead guideway and which could achieve large cabin bank angles for high speed turns. This cabin bank mechanism allows the SVS to maintain a high speed, even when the guideway is collocated with an existing freeway or railroad with relatively tight turn radii. The possibility of collocating the SVS guideway is further improved by the use of cable-stayed guideways with spans of 200 feet or greater. This report describes the static and dynamic tests of a 1:24 scale model of a 250-foot span cable stayed guideway which was designed for a conceptual SVS. The static deflection is measured for various vehicle and wind loading conditions, and these data are compared to theoretical measurements. Experimental results from free vibration tests are then compared with theoretical estimates of the principal resonant frequencies and transient responses. Finally, the measured responses from moving vehicle tests are compared to analytical predictions, and reasons for the differences in amplification factor are discussed. This correlation indicates that the experimentally observed dynamic amplification is greater than the predicted, possibly caused by difficulties in dynamically simulating the vehicle suspension system. The report also presents parametric results from guideway structural and cost analyses.

This document was prepared for the Office of Research, Development and Demonstrations, Federal Railroad Administration, DOT.

Whitelaw, RL Szeless, AG Counts, J Garst, DA
Virginia Polytechnic Institute & State University Final Rpt. FRA-ORD&D-74-18, Apr. 1974, 235 pp

Contract DOT-FR-3004

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
FRA-ORD&D-74-18, DOTL NTIS

11 080885
PARAMETER OPTIMIZATION STUDIES OF MAGNETIC SUSPENSIONS FOR HIGH SPEED GROUND TRANSPORTATION

The present study is part of a program, sponsored by the Office of Research, Development and Demonstrations, Federal Railroad Administration, to investigate efficient, cost-effective methods of high speed ground transportation for intercity travel. Previous aspects of the program have demonstrated the technical feasibility of two types of magnetic suspensions (the attractive-force, and the repulsive-force suspensions) for such applications, and have developed a baseline design for a TMLRV (tracked magnetically levitated research vehicle). The present study is concerned with both of these magnetic suspensions. For the attractive force suspension the objective was the development of a mathematical model which predicts the magnetic behavior of the magnet-rail system at high speed, and a parameter optimization of the magnet. For the repulsive-force suspension the goal was to examine various track geometries to see if the amount of aluminum in the track could be reduced without loss of performance. Experimental studies have been carried out to support the analytical aspects of the program.

This document was prepared for the Office of Research, Development and Demonstrations, Federal Railroad Administration, DOT. Related reports include NTIS PB-223237 and FRA-ORD&D74-41.

Borcherts, RH Davis, LC Wan, CC Mohdulla, AU Reitz, JR
Ford Motor Company Final Rpt. FRA-ORD&D-74-42, Apr. 1974, 159 pp

Contract DOT-FR-10026

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
FRA-ORD&D-74-42, DOTL NTIS

11 080944
OPEN TUBE GUIDEWAY FOR HIGH SPEED AIR CUSHIONED VEHICLES

This invention is a tubular shaped guideway for high-speed air-cushioned supported vehicles. The tubular guideway is split and separated such that the sides of the guideway are open. The upper portion of the tubular guideway is supported above the lower portion by truss-like structural members. The lower portion of the tubular guideway may be supported by the terrain over which the vehicle travels, on pedestals or some similar structure.

Misc-Filed 26 January 1972 Supersedes N72-20253 (10-11, p 1452).

Goering, RS
Langley Research Center, (PAT-APPL-220 785) Patent-3 837-285, 4 pp

ACKNOWLEDGMENT: NTIS (N74-34672/7SL)
PURCHASE FROM: United States Patent Office 2021 Jefferson Davis Highway, Springfield, Virginia, 22161 Repr. PC
N74-34672/7SL, DOTL NTIS

11 080945
COMMENTS ON A GYRO-STABILISED MONORAIL PROPOSAL

The general feasibility, as well as the control aspects of a specific proposal for a gyro-stabilized high-speed train, running on a single monorail below the vehicle center of gravity, and comprised of a standard passenger car

mounted on pairs of angled wheels running on the single rail is discussed. The expected application is to inter-city passenger transportation, e.g., Montreal-Ottawa-Toronto corridor, at speeds in the order of 150 mph. Pneumatic tire suspension is considered, along with the various safety and economic aspects of system implementation. A comparison of the proposed monorail system with the high speed steel-wheel railway and the tracked air cushion vehicle. (Author)

Hamill, PA Hayes, WF Ringer, TR
National Research Council of Canada LTR-CS-77, Dec. 1972, 56 pp

ACKNOWLEDGMENT: NTIS (N74-34679/2SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
N74-34679/2SL, DOTL NTIS

11 080974
PERSONAL RAPID TRANSIT II. PROGRESS-PROBLEMS-POTENTIAL
This collection of over 60 papers was presented at the 1973 International Conference on Personal Rapid Transit in Minneapolis, Minnesota. PRT is the class of fixed-guideway systems in which automated vehicles no larger than small automobiles carry people and/or goods nonstop between any pair of stations in a network of slim guideways that serve major activity centers or may span an entire urban area. There is great emphasis on technological issues with relatively little attention given to issues involved with planning, economics, implementation and the implications of PRT for urban society. The papers are classified in ten sections in the volume.

These papers were presented at the International Conference on the Personal Rapid Transit, 1973.

Minnesota University, Minneapolis Dec. 1973, 645 pp, Figs., Tabs., Refs.

PURCHASE FROM: Minnesota University, Minneapolis Department of Audio Visual Extension, Minneapolis, Minnesota, 55455 Repr. PC

11 081184
LATERAL STABILITY OF A DYNAMIC RAM AIR CUSHION VEHICLE
The lateral stability derivatives of a dynamic ram air cushion vehicle in a rectangular guideway were measured using a ship model towing tank. Lift and pitching moment are also reported. The primary lateral derivatives are all stabilizing, with significant cross coupling in some cases. The longitudinal forces are compared with the numerical prediction of the one-dimensional mass conservation theory given by Boccadoro, with good agreement. A trailing edge Trefftz analysis is presented and used to predict the lateral derivatives. Comparison with the lateral data is good for side displacement derivatives but is less successful for yaw angle derivatives. The towing tank is found to be an effective method for testing dynamic air cushion vehicles.

Prepared by Massachusetts Inst. of Tech., Cambridge. Aerophysics Lab.

Aidala, PV
Transportation Systems Center, Federal Railroad Administration, Massachusetts Institute of Technology Final Rpt. DOT-TSC-FRA-74-6, Aug. 1974, 72p

Contract DOT-TSC-239

ACKNOWLEDGMENT: NTIS (PB-236516/1ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236516/1ST, DOTL NTIS

11 081256
THE SINGLE-INDUCTOR LINEAR MOTOR CHARACTERISTICS AND APPLICATIONS [Le moteur lineaire a un inducteur. Caracteristiques et applications]
By application to a given motor (mechanical rating 74 kW, nominal speed 15 m/s; 8 poles, 50 cycles; length 1600 mm, width 200 mm, thickness 95 mm; air gap 5 mm; width of armature 200 mm, thickness 3 mm, aluminium; solid yoke; linked to armature; 18 mm thick), complete calculation methods are developed in the article, based on the solution of Maxwell equations in the various areas concerning air gap and armature and, with the use of graphs, the authors demonstrate how parameters such as the influence of end and side effects, the resistivity and thickness of the armature, the air gap and the type of magnetic yoke, have an influence on thrust, output, the power factor and the motor utilization coefficient. The authors then propose several solutions for perfecting the motor, and conclude with considerations on possible applications in the context of electric traction and mechanical handling. [French]

Jufer, M Mattatia, S *Bulletin des Schweizerischen Elektrotech Vereins* Vol. 65 No. 12, 1974, pp 880-891, 23 Fig., 1 Tab., 8 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1110)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

11 081257
THE TEST CENTRE FOR TRANSPORT TECHNIQUES [Die Versuchsanlage fuer Verkehrstechniken]
Following a survey of the technical and economic results of the studies finalised by the Company for studies on high-speed, large-capacity railways, an examination is made of the technical details relating to the test centre to be set up at Donauried, where experiments are to be made with the magnetic levitation technique up to a speed of 500 km/h, and with the wheel/rail technique up to 400 km/h. Endurance tests are also planned in connection with the crossing of trains; it is also intended to construct a main running track with loop for linear motor tests. This test centre is due to be completed by 1978, if preparation of the site and elaboration of the plan are terminated by 1975. [German]

Topfener, W *Eisenbahningenieur* Vol. 25 No. 5, May 1974, pp 175-181, 16 Fig., 1 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1117)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

11 081383
INFLUENCE OF LONGITUDINAL FRINGE EFFECT ON THE OPERATION OF HIGH SPEED TRACTION INDUCTION LINEAR MOTORS
Considerable attention is being given, in many countries to the problems of linear induction motors for high and super-high speeds. Nevertheless the use of the linear motor as a traction motor has given rise to controversy with regard to its operational limits for land vehicles. With increase in speed the longitudinal fringe effect due to physical relationships of the reactive bus and the inductive gap, termed the "entrance-exit" processes, have attained considerable importance. The results of tests carried out with a model traction linear motor in the Leningrad Polytechnical Institute are discussed in this article.

Skobelev, VE (Leningrad Polytechnical Institute) *Rail International* No. 12, Dec. 1974, pp 767-781, 24 Fig., 7 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

11 265264
LINEARIZED MODELS, STABILITY CRITERIA AND EXPERIMENTAL VERIFICATION FOR PLENUM AIR CUSHIONS WITH COMPRESSOR-DUCT INTERACTIONS
An analytical and experimental investigation of the static and dynamic behavior of nearly full scale pleunum-type air cushion suspensions is described, including the effects of compressor-duct dynamics and secondary suspension characteristics. The results indicate that cushion-duct interactions may strongly affect cushion stability unless the lowest resonant frequency of the duct is much higher than the cushion unsprung mass natural frequency. Criteria are suggested for selecting appropriate duct models for use in suspension dynamic analysis. For most practical systems a second- or at most fourth-order duct model will adequately represent the distributed duct dynamics. The report is the latest in a series of investigations whose goal is experimentally verified models, advanced concepts and design criteria for pressurized air cushions which will permit safe and comfortable operation of high speed tracked levitated vehicles over economically feasible guideways.

Sweet, LM Richardson, HH Wormley, DN
Massachusetts Institute of Technology, Federal Railroad Administration May 1974, 127 pp

Contract DOT-FR-10007

ACKNOWLEDGMENT: NTIS (PB-235750/7)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235750/7, DOTL NTIS

12 052592
AUTOMATIC WARNING OF TRACK MAINTENANCE GANGS. THEORETICAL STUDY TO ASCERTAIN THE OPTIMUM ACOUSTIC WARNING SIGNALS IN THE PRESENCE OF SEVERE BACKGROUND NOISE
The report contains a description of a theoretical study concerning the complex psycho-acoustic and psychological aspects of signal perception when the signals are masked by interfering noise. The report also suggests what features appear to be the most favourable for acoustic warning signals, and makes proposals for the continuation of the study.

International Union of Railways B124/RP 41E, Apr. 1974, 30 pp, 2 Fig., 1 Tab.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

12 057325
SAFETY FOR RAILROAD EMPLOYEES—CAN WE ACHIEVE SUCCESS. REPORT OF COMMITTEE NO. 1
Assuring the safety of employees, operating or non-operating, contributes greatly to the success and production on railroads. The subject of safety is analyzed and it is concluded that railroad supervisors are the key people in influencing the safety of the people they supervise. It is essential that they show a genuine interest in the employees and their welfare; that they be firm and fair; that they ensure that challenging work is offered; and, above all, that they respect the people and their professionalism in how to do the job in a safe manner.

Appeared in the proceedings of the Seventy-Seventh Annual Meeting, American Association of Railroad Superintendents, Denver, Colorado, June 19-21, 1973, and Washington, D.C., January 22 and 23, 1973. Entire proceedings available for $15.00.

American Association of Railroad Superintendents Proceeding 1974, pp 126-132, 1 App.

ACKNOWLEDGMENT: American Association of Railroad Superintendents
PURCHASE FROM: American Association of Railroad Superintendents 18154 Harwood Avenue, Homewood, Illinois, 60403

12 057336
CRIME IN RAPID TRANSIT SYSTEMS: AN ANALYSIS AND A RECOMMENDED SECURITY AND SURVEILLANCE SYSTEM
This study is directed toward identifying the influence that crime has on transit ridership and toward developing measures for increasing patron and system security on a major transit network. Because of the preponderance of crime and harassment on rapid transit as opposed to surface transit, recommendations are directed toward test demonstrations on the rapid transit segment of the system. All suggested improvements are based on systematic analyses of transit crime patterns, ridership trends, a survey of public perception of transit crime, present security measures, and general operating procedures. Profiles of transit crime are derived from an 18-month series of crime data collected on the system. A crime-ridership index is employed to measure risk to patrons on various parts of the transit system. Present inadequacies in surveillance and response capability of police are described. The question of increasing manned patrols as opposed to substituting electronic or mechanical systems is examined from the viewpoint of assuring patrons of rapid protective response should an emergency arise. A publicly activated closed-circuit television system is offered as one means of addressing the security needs on high-risk portions of the rapid transit network.

Shellow, R Romualdi, JP Bartel, EW (Carnegie-Mellon University) *Transportation Research Record* No. 487, 1974, pp 1-12, 5 Fig., 5 Ref.

PURCHASE FROM: TRB Repr. PC

12 057337
SUMMARY REPORT ON VANDALISM AND PASSENGER SECURITY IN THE TRANSIT INDUSTRY
This paper summarizes the findings of a study on crime, vandalism, and passenger security on urban transit systems. The study's major goals were to appraise the national scope of transit crime and vandalism and to explore means of controlling the problems and make suggestions on the basis of the research findings. The emphasis in this summary is on means of controlling the problems. Several ideas to control transit crime and vandalism are discussed: the use of materials that are specially fashioned to withstand criminal and vandal acts on transit; procedures and tactics to protect transit passengers, employees, and properties and ways to detect and deter offenders, keep them under surveillance, and apprehend them when necessary; mechanical and electronic devices, as well as features of stationary sites, for assisting police and security forces in their duties; programs for involving the community in formulating anticrime and vandalism measures and programs for maintaining a liaison with educational authorities and personnel; the methodical cultivation of good relations with police, courts, and the media; and the attitudes of the public toward transit crime and vandalism to ascertain whether fear of crime and vandalism influences passenger decisions to use urban transit. Suggestions for further research on transit crime, vandalism, and passenger security are also given.

Thrasher, EJ Schnell, JB (American Transit Association) *Transportation Research Record* No. 487, 1974, pp 46-54, 3 Ref.

PURCHASE FROM: TRB Repr. PC

12 057338
STUDIES OF PUBLIC ATTITUDES TOWARD TRANSIT CRIME AND VANDALISM
This paper describes the findings of six studies in five cities on the question of whether fear of transit crime and vandalism affects a person's decisions to use urban transit systems. Although the studies do not give a firm answer, they offer some tentative conclusions: Transit crime and vandalism can exert strong influence on decisions concerning use of urban transit, but there are many variations depending on the volume of crime or vandalism in the area served by a particular route, the transportation alternatives available to passengers, the hours at which they must ride, and other factors. In general, transit crime and vandalism are more likely to influence passenger decisions concerning riding on rapid transit than on buses. Riders are more likely to view with serious concern the potentially menacing aspects of rowdyism such as verbal threats and vandalism than "nuisance" aspects such as the pushing and shoving involved in horseplay. Riders' concern is likely to be more intense when they personally witness crime or serious rowdyism than when they are not personally involved. Those who are reluctant to ride urban transit because of personal security considerations least favor riding after 7:00 p.m. Transit crime and vandalism may have a potential influence on all classes of riders regardless of age or sex, although possibly not in the same degree. It is extremely difficult to establish that a given change in ridership is caused by a single factor such as crime or vandalism. In any situation, there may be a combination of factors that influence ridership and make it all but impossible to determine the degree of influence of any one factor.

Thrasher, EJ Schnell, JB (American Transit Association) *Transportation Research Record* No. 487, 1974, pp 26-33, 3 Ref.

PURCHASE FROM: TRB Repr. PC

12 057339
SCOPE OF CRIME AND VANDALISM ON URBAN TRANSIT SYSTEMS
This paper reports on an attempt to quantify the extent and seriousness of crime and vandalism on urban transit systems. Although many imprecisions in the recording of criminal incidents and the computing of vandalism costs impose limitations on the data, the authors believe that the findings constitute a significant first step toward knowledge of the incidence of transit crime and the monetary costs of transit vandalism. On the basis of data obtained from 37 U.S. transit systems, the total number of criminal incidents on all systems in 1971 is estimated at approximately 33,000 to 39,000. No functional relationships were found between various factors such as total crime indexes and total crime per 100,000 vehicle-miles or 100,000 revenue-passengers. A computed transit exposure index led to the tentative conclusion that the risk of being involved in a criminal incident could be at least twice as great when riding on urban transit vehicles as in nontransit circumstances. If this conclusion is sound, the problem of crime on transit systems may be proportionately more serious than has been generally credited. The total national transit vandalism costs for 1971 are estimated at $7.7 million. Direct transit vandalism costs on the average amounted to less than 0.5 percent of operating costs in 1971, but the problem assumes greater dimensions when indirect costs are also considered. Window breakage was the largest component, followed by damage to seats, damage to stationary facilities, and graffiti. National transit system costs of liability claims resulting from incidents of crime and vandalism in 1971 are estimated at $1.85 million to $2.33 million.

Thrasher, EJ Schnell, JB (American Transit Association) *Transportation Research Record* No. 487, 1974, pp 34-45, 7 Tab.

PURCHASE FROM: TRB Repr. PC

12 057348
ANTI-DERAILMENT SENSOR SYSTEM. PHASE I. FEASIBILITY STUDY
In the context of items of hardware which have been developed for military use, principal causes of derailments were studied to determine those amenable to anticipation detection or by on-board sensors. Other elements for relaying sensor outputs and taking appropriate action to prevent or ameliorate the effects of derailment were combined into system concepts. Hardware for key and unique functions was fabricated and tested. Test results and experience data were used to combine the most promising alternatives into systems, for which tangible benefit versus sensor system cost estimates were made. A basic hotbox detector system with phase-change-alloy thermal sensors actuating the train air brake via a self-powered electrical on-car communication system is proposed as feasible, compatible with railroad operating practices, and productive of major net cost benefits. Associated systems for incipient resonant rock-off and local derailment detection are discussed.

Armstrong, JH Kluge, FC Swaim, FH Terrell, JD Wassmann, WW Naval Ordnance Laboratory Final Rpt. Apr. 1973, 214p

ACKNOWLEDGMENT: NTIS (PB-232417/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232417/6, DOTL NTIS

12 057355
PREDICTION OF HAZARDS OF SPILLS OF ANHYDROUS AMMONIA ON WATER
Maritime transport of liquid anhydrous ammonia (LNH3) poses a potential hazard to the public, to aquatic life, and to other shipping should there be an accidental surface or underwater release of ammonia. This report contains the results of an experimental and analytical program aimed at evaluating the hazards presented by a 3,000 ton release of liquid anhydrous ammonia on water. Test spills were conducted in the laboratory (up to 1/2 gallons), in a swimming pool (5 gallons) and in a lake (50 gallon size) and the fraction of released ammonia dissolving in water and the amount vaporizing were determined. The dispersion of vapor in air was measured and a theory was developed to predict the movement. Analytical models to predict water dispersion are also presented. (Modified author abstract)

Raj, PK Hagopian, J Kalelkar, AS Final Rpt. ADL-74763-F, Mar. 1974, 257 pp

Contract DOT-CG-22182-A

ACKNOWLEDGMENT: NTIS (AD-779400/1)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-779400/1, DOTL NTIS

12 057499
AMERICAN RAILCARS—A STUDY IN SAFETY
The author has compiled data on accidents involving railcars in America, as part of a larger study and forthcoming publication on the general use of railcars. The article first presents what the author believes are the important elements of safety for railcars. Following this, there is a review of various accidents, which are classified into several types. The accidents are analyzed and evaluated, within limits of the available information. Finally, the author presents some figures to estimate the probability of railcar accidents, to aid in a conclusion as to whether railcars were more or less safe than locomotive-driven trains.

Also available through ESL.

Prosser, RS *Rail International* No. 2, Feb. 1974, pp 143-153

ACKNOWLEDGMENT: UIC
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

12 057538
SYSTEM FOR EVALUATION OF THE HAZARDS OF BULK WATER TRANSPORTATION OF INDUSTRIAL CHEMICALS
This is a report of results, to date, of the efforts of the Committee on Hazardous Materials to develop and evolve a scheme of hazard evaluation. The Hazard Evaluation System described in this report employs four main classes of hazards: fire, health, water pollution, and reactivity; and further subdivides the health, water pollution, and reactivity into subclasses. Under each class or subclass, a numerical rating is given to indicate the relative degree of potential hazard. General guidelines were developed to describe five levels of severity for each. The Committee, using those general guidelines, has rated 367 industrial chemicals suggested by the Coast Guard. It should be borne in mind that these ratings relate to hazardous situations that may arise in the marine transportation of the materials under consideration, and are not necessarily applicable to other situations.

This is a report to the Department of Transportation, United States Coast Guard.

National Academy of Sciences Proj. Rpt. Feb. 1974, 42 pp, Tabs., Refs.

Contract DOT-CG-41680-A

ACKNOWLEDGMENT: National Academy of Sciences
PURCHASE FROM: National Academy of Sciences-Natl Research Council 2101 Constitution Avenue, NW, Washington, D.C., 20418 Repr. PC

12 057728
SUBJECTING IMPACT RESISTANT DRIVERS' SIGHT SCREENS TO THE TEST
Triplex windscreens tested for Italian State Railways high-speed Ale 601 requirements establish reliability at speeds in the order of 250 km/h as did an incident on a test run with the BR HST on last August 2.

Rail Engineering International Vol. 4 No. 5, June 1974, p 233

PURCHASE FROM: ESL Repr. PC, Microfilm

12 057860
LIGHTING EFFECT IN THE SMOKE OF TUNNEL FIRE
To investigate an appropriate lighting system for safe evacuation of passengers from tunnels and to compare three types of lamps—fluorescent, high-pressure mercury and high-efficiency sodium—in transmittance through fire and smoke and as normal tunnel illumination, measurements were carried out. Also checked was the visibility in smoke of indicator lamps showing location of telephones and other facilities. As a result of test, a 40-watt fluorescent lamp was chosen for tunnel illumination and a 20-watt fluorescent for indicator lamps. Through these tests, it has been made clear that even if surface luminance of an indicator lamp exceeds 1000 cd/sq m, the threshold smoke density does not increase correspondingly.

Tanaka, H Takaoka, S *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 83-84, Tabs.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

12 057878
RAILROAD ACCIDENT REPORT: HAZARDOUS MATERIALS RAILROAD ACCIDENT IN THE ALTON AND SOUTHERN GATEWAY YARD IN EAST ST. LOUIS, ILLINOIS, JANUARY 22. 1972
At about 6:20 a.m., on January 22, 1972, an overspeed tank car loaded with liquid petroleum gas collided with a standing hopper car in the Alton & Southern Railroad Company's Gateway Yard in East St. Louis, Ill. In the overspeed impact, an overriding coupler on the empty freight car punctured the tank head. The pressurized propylene gas in the tank car leaked to the ground and vaporized. A large vapor cloud was formed, which ignited and exploded. More than 230 people were injured as a result of the explosion, and property damage was estimated at more than $7-1/2 million. The National Transportation Safety Board determines that the probable cause of the overspeed impact was the failure of the retarding system in the hump classification yard to decelerate effectively heavy cars with oil or grease on their wheel rims; the absence of a backup system to halt cars passing through retarders at overspeeds; and the routine acceptance at the Gateway Yard of uncontrolled overspeeds. Propylene leaked from the tank car because the tank head was too weak to resist the impact of the overriding coupler of the hopper car. Lack of specifications that define permissible impact and adequate crash resistance was a contributing factor.

Railroad Accident Report. This report contains Railroad Safety Recommendations R-73-1 through R-73-4.

National Transportation Safety Board, (SS-R-18) NTSB-RAR-73-1, Jan. 1973, 25 pp, Figs., Tabs., Phots.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-217429/0, DOTL NTIS

12 057879
RAILROAD/HIGHWAY ACCIDENT REPORT: PENN CENTRAL FREIGHT TRAIN/SCHOOLBUS COLLISION NEAR CONGERS, NEW YORK, MARCH 23, 1972
At about 7:55 a.m., on Friday, March 24, 1972, an eastbound schoolbus was driven across a grade crossing on Gilchrist Road, near Congers, N.Y., and was struck by the lead locomotive of a northbound Penn Central freight train. Except for a stop sign, at which the busdriver failed to stop, and a standard railroad-crossing sign, the crossing was not specially protected. After impact the schoolbus was driven 1,116 feet down the track by the train, and the body structure of the bus disintegrated. The rear section of the bus was torn loose, fell beside the track, and overturned with a number of students underneath. Two of the several students who were ejected from the remaining portion of the bus passed through separated floor sections and fell between the rails into the path of the train. As a result of the accident five students died, and the busdriver and all 44 remaining students were injured. None of the train crew was injured. The National Transportation Safety Board determines that the cause of this accident was the failure of the schoolbus driver to stop at the stop sign until the crossing was clear of railroad traffic. Contributing to the accident was the unnecessary routing of the schoolbus over a not specially protected railroad/highway grade crossing.

Railroad/Highway Accident Report. This report contains Highway Safety Recommendations H-73-10 through H-73-15.

National Transportation Safety Board, (SS-R/H-6) NTSB-RHR-73-1, Mar. 1973, 44 pp, Figs., Tabs., Phots., 4 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

12 057880
RAILROAD ACCIDENT REPORT: COLLISION OF MISSOURI PACIFIC RAILROAD COMPANY FREIGHT TRAIN EXTRA 615 SOUTH WITH A STANDING LOCOMOTIVE, COTULLA, TEXAS, DECEMBER 1, 1973
At 8:30 a.m., Saturday, December 1, 1973, Missouri Pacific Railroad Company freight train Extra 615 South (train DMX) entered Cotulla, Texas. Train DMX was traveling on a nonsignalized main track at a speed of 35 to 40 mph. Just after it passed over a grade crossing, the train was diverted through a switch onto an adjacent track where an unmanned locomotive, a caboose, and 11 cars were standing. Train DMX collided with the standing locomotive before any appreciable braking. The collision derailed all of the locomotive units and 29 railroad cars. Three crewmembers who were riding in the lead locomotive unit of train DMX were killed. The National Transportation Safety Board determines that the probable cause of this accident was the establishment of a collision route for train DMX by the unauthorized operation of a switch by persons unknown. Contributing to the collision were railroad operating practices which authorize engineers to operate trains at speeds at which they could not stop short of a switch target which indicates the switch is improperly aligned. Contributing to the severity of the collision was the fact that the crewmembers of the locomotive of train DMX did not identify the open switch and apply the train's brakes soon enough to slow the train. The report contains recommendations to the Missouri Pacific Railroad Company and the Federal Railroad Administration.

Railroad Accident Report. This report contains Railroad Safety Recommendations R-74-22 through R-74-28.

National Transportation Safety Board, (SS-R-27) NTSB-RAR-74-3, June 1974, 36 pp, Figs., Phots., 3 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

12 057881
RAILROAD ACCIDENT REPORT. COLLISION OF THE STATE-OF-THE-ART TRANSIT CARS WITH A STANDING CAR, HIGH SPEED GROUND TEST CENTER, PUEBLO, COLORADO, AUGUST 11, 1973
On August 11, 1973, the UMTA state-of-the-art rail rapid transit cars (SOAC's) collided with a standing railroad gondola car at the U.S. Department of Transportation's High Speed Ground Test Center near Pueblo, Colo. The SOAC's were being operated on the transit test track when they were inadvertently diverted through a switch onto an adjacent track and into the gondola. The motorman on the SOAC was killed. The National Transportation Safety Board determines that the probable cause of this crash was the failure of a locomotive crewmember to align a switch properly and the failure of the motorman to detect the open switch in sufficient time to stop the SOAC's short of a gondola standing on the track. Contributing to the accident were the failure of the Transportation Systems Center's representatives (UMTA's systems manager) to implement operating procedures that would secure the intended pathway and the absence of a systematic risk management program at the Highway Speed Ground Test Center. This report examines the crashworthiness of the SOAC's and the institutional errors that led to the accident. Recommendations intended to prevent a recurrence of the accident and to improve crashworthiness of rail transit cars are directed to the Federal Railroad Administration and the Urban Mass Transportation Administration.

Railroad Accident Report. This report contains Safety Recommendations R-74-13 through R-74-21.

National Transportation Safety Board NTSB-RAR-74-2, May 1974, 53 pp, Figs., Phots., 4 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

12 057920
A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK. EXECUTIVE SUMMARY (REVISED)
This summary presents the results of the six-month study begun in October 1973 and is an abbreviated version of the final report (COM-74-11271). The objective in the study was to analyze quantitatively the economics and safety of transporting selected bulk hazardous substances, other than oil, by inland waterway and overland (rail, truck, and possibly pipeline) modes, so that the costs and risks associated with the different modes could be compared. There were three major components to this process: (1) choosing the substances, origin-designation combinations, and shipment characteristics to be studied; (2) determining all costs involved in transporting each substance between the designated points by barge and relevant overland modes; and (3) determining the frequency and quantity of spills likely with each mode and the resultant risk to people, property, and the environment.

See also Final Report COM-74-11271. RRIS #057921.

Little (Arthur D), Incorporated Final Rpt. ADL-C-76446-5, May 1974, 38p

Contract C-76446t

ACKNOWLEDGMENT: NTIS (COM-74-11270/7)
PURCHASE FROM: NTIS Repr. PC, Microfiche

COM-74-11270/7, DOTL NTIS

12 057921
A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK
The movement of hazardous materials through transportation channels creates risks which are not fully understood. Consequently, the question of which was the best mode of transportation for the movement of hazardous substances had to be examined quantitatively. The objective of this study was to quantitatively analyze the economic and safety aspects of transporting hazardous substances by inland waterway and overland (pipeline, rail and highway) modes so that the comparative costs and risks of the different modes could be assessed. The chemicals studied as examples are acrylonitrile, anhydrous ammonia, benzene, caustic soda, chlorine, ethylene glycol, methanol, styrene, sugar, and sulfuric acid.

See also Executive Summary rept., COM-74-11270. RRIS #057920.

Little (Arthur D), Incorporated Final Rpt. ADL-C-76446-F, May 1974, 266 pp

Contract C-76446t

PURCHASE FROM: NTIS Repr. PC, Microfiche

COM-74-11271/5, DOTL NTIS

12 071612
RAILROAD/HIGHWAY ACCIDENT REPORT: ILLINOIS CENTRAL RAILROAD COMPANY TRAIN NO. 1 COLLISION WITH GASOLINE TANK TRUCK AT SOUTH SECOND STREET GRADE CROSSING, LODA, ILLINOIS, JANUARY 24, 1970
About 9:55 a.m., on January 24, 1970, Illinois Central Railroad southbound passenger train No. 1, moving at a speed of 79 miles per hour on

track No. 1, struck a motortruck loaded with gasoline on the South Second street crossing in Loda, Illinois. The tank of the truck was split open, spilling the gasoline which exploded and caught fire. The burning gasoline covered the exterior of the locomotive unit and entered the control compartment through the nose door, damaged nose, and other openings. Three employees of the railroad, who were occupying the control compartment of the lead locomotive unit at the time of the accident, and the driver of the motortruck received fatal injuries from the burning gasoline. The National Transportation Safety Board determines that the probable cause of this accident was that the operator drove the gasoline-laden truck, without stopping, onto the tracks immediately in front of the approaching train, while the crossing warning device was indicating the train's approach.

National Transportation Safety Board NTSB-RHR-71-1, July 1971, 28 pp, Phots., Apps.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-202869, DOTL NTIS

12 071746
RAILROAD ACCIDENT REPORT: ILLINOIS CENTRAL RAILROAD COMPANY AND INDIANA HARBOR BELT RAILROAD COMPANY COLLISION BETWEEN YARD TRAINS AT RIVERDALE, ILLINOIS ON SEPTEMBER 8, 1970
At 11:08 p.m. September 8, 1970, a collision occurred between Illinois Central (IC) Train 1218 and Indiana Harbor Belt (IHB) Train 8717 at Riverdale, Illinois. The collision of the two yard trains resulted in two fatalities and two serious injuries. Five cars and the caboose of the IC train were derailed and the locomotive cab of the IHB train was demolished. The IHB train was crossing over from an interchange track to an IC main track when the locomotive was struck by the unlighted caboose of the IC train. The IC locomotive was shoving 22 cars, and the caboose had passed a signal indicating "Restricted Proceed" 715 feet prior to impact. The safety Board determined that the accident resulted from the failure of the IC crewmembers to operate IC Train 1218 at a speed so as to be able to avoid the collision. Additional contributing factors included: (a) the failure of IC crewmembers to display a light and occupy a conspicuous position when shoving cars as required by rule; (b) the failure of the IC to provide additional protection when track changes initiated a permanent display of "Restricted Proceed" for the involved signal in 1969; and, (c) inadequacies in operating rules, practices, and personnel training. Contributing to the accident severity was the lack of crash protection provided the occupants of the IHB locomotive.

National Transportation Safety Board NTSB-RAR-71-3, Nov. 1971, 38 pp, Figs., Phots.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-206325, DOTL NTIS

12 071747
RAILROAD ACCIDENT REPORT: CHICAGO, BURLINGTON AND QUINCY RAILROAD COMPANY TRAIN 64 AND TRAIN 824 DERAILMENT AND COLLISION WITH TANK CAR EXPLOSION CRETE, NEBRASKA, FEBRUARY 18, 1969
At about 6:30 a.m., on February 18, 1969, Chicago, Burlington, and Quincy Train No. 64 derailed the 72nd to the 90th cars, inclusive, at a turnout located on the spiral of a 2 degree curve as the train was entering Crete, Nebraska, at a speed of about 52 miles per hour. The derailed cars struck standing cars on a siding south of the main track and the cars of train 824 standing on a track north of the main track. A tank car in train 824 was completely fractured on impact with the derailed cars which released the lading of 29,200 gallons of anhydrous ammonia into the atmosphere. A gas cloud was formed which blanketed the surrounding area for a considerable time due to the weather conditions. Three trespassers riding on train 64 were killed as a result of the derailment and six people were killed and 53 were injured as a result of exposure to the cloud of ammonia. The Safety Board determined that the derailment was caused by the movement of a rail of the turnout due to lateral forces produced by the locomotive as it moved over track alignment and surface deficiencies of the track. The complete fracture of the tank car on impact was contributed to by the brittleness of the steel of the car caused by the low ambient temperature.

National Transportation Safety Board NTIS-RAR-71-2, Feb. 1971, 79 pp, Figs., Tabs.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-198790, DOTL NTIS

12 071749
RAILROAD/HIGHWAY ACCIDENT REPORT: BOSTON AND MAINE CORPORATION SINGLE DIESEL-POWERED PASSENGER CAR 563 COLLISION WITH OXBOW TRANSPORT COMPANY TANK TRUCK AT SECOND STREET RAILROAD-HIGHWAY GRADE CROSSING EVERETT, MASSACHUSETTS, DECEMBER 28, 1966
At 12:10 AM, on December 28, 1966, eastbound firstclass passenger train No. 563, consisting of a single car diesel-powered passenger unit operated by the Boston and Maine Corporation collided with a northbound motor tank truck owned and operated by the Oxbow Transport Corporation stopped across the Second Street grade crossing at Everett, Mass. The collision resulted in the death of 11 of a total of 28 passengers and 2 of the 3 train crew members and other injuries and damage to property. The semi-trailer of the tank truck containing 8,200 gallons of fuel oil ruptured on impact, covering the forward end of the passenger car with the oil. A spread of flames immediately covered the forward section of the car. The fatalities were due to thermal burns and smoke inhalation. There was a lack of emergency exits in the car, in addition to an inward opening rear door which became jammed in a closed position while people were attempting to escape. The truck driver had left the vehicle prior to impact and was not injured. The probable cause of the accident was the loss of air pressure in the brake systems of the tractor-trailer which resulted in an automatic application of the brakes that could not be released from the cab of the tractor and therefore held the tractor-trailer directly across the Boston and Maine track at the collision point.

National Transportation Safety Board Feb. 1968, 56 pp, Figs., Phots., 5 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC
PB-190212, DOTL NTIS

12 071750
RAILROAD ACCIDENT REPORT: SOUTHERN PACIFIC RAILROAD COMPANY FRUITRIDGE ROAD GRADE CROSSING SACRAMENTO, CALIFORNIA, FEBRUARY 22, 1067
On February 22, 1967 at 12:05 PM, a station wagon traveling east on Fruitridge Road in Sacramento, California collided with a Southern Pacific Company freight train traveling north at the intersections of the Southern Pacific railroad tracks and Fruitridge road. Immediately prior to and after the collision, the flashing lights and bells of the automatic railroad crossing warning devices were functioning properly. In addition, the engineer was sounding the locomotive's horn and bell in the prescribed manner, and the locomotive's regular and oscillating headlights were functioning. The station wagon was destroyed and the nine occupants killed. The train was not derailed nor was the train crew harmed and the lead locomotive suffered only minor damage. The probable cause of the accident was failure of the driver of the station wagon to stop his vehicle short of the grade crossing and to remain clear of the track as required by California State law.

National Transportation Safety Board Jan. 1968, 31 pp, 2 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-190216, DOTL NTIS

12 071754
RAILROAD ACCIDENT REPORT: RICHMOND, FREDERICKSBURG AND POTOMAC RAILROAD COMPANY TRAIN NO. 10/76 DERAILMENT WITH THREE FATALITIES AND NUMEROUS PERSONAL INJURIES, FRANCONIA, VIRGINIA, JANUARY 27, 1970
Train No. 10/76 derailed on Richmond, Fredericksburg and Potomac (RF&P) 1970. The train consisted of one express car, one postal car, two

baggage cars, four coaches, two sleeping cars, and three diesel-electric locomotive units. The train proceeded northbound on No. 2 track and at Possum Point, 80 miles north of Richmond, crossed over to No. 3 track to avoid conflict with a local freight. On approaching Franconia, speed was reduced from 80 miles per hour to 70 miles per hour; at Franconia, speed was further reduced to 65 miles per hour, and as the train traversed the north end of a curve, the locomotive lurched severely to the left. Immediately thereafter, the derailment occurred. The accident resulted in the derailment of the eight rear cars of the train. The third, fourth, and fifth cars remained upright and coupled to the head end of the train. A separation occurred between the fifth and sixth cars, and between each of the following cars. The sixth through 10th car veered to the left down a bank, and either partially or completely overturned. Of the 101 passengers in the 10 cars, three were killed, five incurred injuries requiring hospitalization and 45 persons were treated for less serious injuries. The National Transportation Safety Board determines that the probable cause of the derailment was the lateral movement of the track immediately ahead of the locomotive, due to conditions resulting from inadequate track maintenance procedures.

National Transportation Safety Board, (SS-R-9) NTSB-RAR-71-1, Feb. 1971, 57 pp, Figs., 5 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Repr. PC

PB-198263, DOTL NTIS

12 071755
RAILROAD ACCIDENT REPORT: PENN CENTRAL TRANSPORTATION COMPANY FREIGHT TRAIN DERAILMENT PASSENGER TRAIN COLLISION WITH HAZARDOUS MATERIAL CAR, SOUND VIEW, CONNECTICUT, OCTOBER 8, 1970

At 8:50 p.m., October 8, 1970, Penn Central Transportation Company's freight train derailed near Sound View, Connecticut. Freight cars obstructed track in the path of Penn Central passenger train. The passenger train struck the freight cars, puncturing an LPG tank car designated as "empty." The derailed units of the passenger train passed through ignited gases from the punctured tank car and crossed a railroad bridge. Train crewmembers and passengers were injured. The Safety Board has determined that the probable cause of the derailment of the freight train was the breakage of a truck side of a car on the freight train which followed a progressive fatigue crack failure. The breakage of the truck side resulted in damage to a turnout, which caused derailment of the following cars. The cause of the collision to the passenger train was the obstruction of track No. 2 by cars of the freight train. The Board concluded industry controls to prevent application of improper car components are inadequate, empty tank cars may be hazardous, and suggested that the industry should incorporate crashworthy concepts, improve communication and equipment design, and controls over maintenance, retirement, and testing of equipment components. The Board requested that bridge standards and joint corridor usage be reviewed.

National Transportation Safety Board NTSB-RAR-72-1, Dec. 1971, 49 pp, 16 Fig., Phots., 5 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-207621, DOTL NTIS

12 071759
RAILROAD ACCIDENT REPORT: ILLINOIS CENTRAL RAILROAD COMPANY TRAIN SECOND 76 DERAILMENT AT GLENDORA, MISSISSIPPI, SEPTEMBER 11, 1969

About 2:35 p.m., September 11, 1969, an Illinois Central freight train struck a pedestrian near the Glendora, Mississippi, station. When the engineer applied the brakes in full emergency in an attempt to avoid striking the pedestrian, the 149-car train buckled at the 108th car. The resulting derailment involved 15 cars, including eight tank cars loaded with vinyl chloride. The cars separated in the derailment and the coupler of one of the cars punctured one of the tank cars, spilling its contents on the ground. Initially, the breeze dispersed the vapor; however, about 8:30 p.m. the vapor accumulated in low places and was ignited by an unknown source. The ignition was followed by several explosions. Upon advice from a State chemist, an estimated 17,000 to 21,000 persons were evacuated because of an alleged danger from phosgene. The following morning a fire-impinged tank car of vinyl chloride exploded violently, seriously damaging the surrounding area. Four tenant houses, several auxiliary buildings, automobiles, and equipment were destroyed and damaged by fire. The pedestrian was seriously injured and a power company employee was burned. Both recovered. The Safety Board determines that the derailment was caused by the buckling of the underframe of the 108th car when the engineer made a full emergency brake application in an attempt to avoid striking a pedestrian who was walking in the track. The car buckled because of excessive and uncontrollable compression in the train which developed when the full emergency brake application created greater braking force on the head of the train than on the rear. The fire and explosions resulted from the rupture of a tank car of vinyl chloride by the coupler of one of the derailed cars. The absence of underlocking couplers and other means of preventing separation and jacknifing allowed the cars to jam up together. The pileup resulted in additional mechanical damage to the tanks and allowed the fire from the leaking tank to impinge on the others.

National Transportation Safety Board NTSB-RAR-70-2, Aug. 1970, 24 pp, 2 Fig.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-194696, DOTL NTIS

12 071784
STATISTICAL SURVEY OF ELECTRICAL ACCIDENTS ON ITALIAN STATE RAILROADS IN THE THREE-YEAR PERIOD 1970-1972 AND PREVENTION MEASURES [Indagine Statistica Sugli Infortuni Elettrici Occorsi Nell'Azienda F.S. Nel Triennio 1970-72 E spunti di Prevenzione]

A statistical survey has been carried out regarding electrical accidents occurring on the F. S. (Italian State Railroads) in the three-year period 1970-72. In order to obtain the data, use was made of the report of accidents which FS compiles for each case. From the 54,000 accident reports, 166 were taken regarding electrical accidents; these are characterized, in spite of the relatively low number, by a considerable gravity which justifies any form of study aimed at going deeper into the question in order to implement efficient measures of prevention. The study is completed with some indications for the prevention of electrical accidents. [Italian]

Melino, C Dominici, R *Ingegneria Ferroviaria* Vol. 29 No. 2, Feb. 1974, pp 110-119, 16 Ref.

ACKNOWLEDGMENT: EI (EI 74 802123)
PURCHASE FROM: ESL Repr PC, Microfilm

12 071838
RAILROAD ACCIDENT REPORT: NEW YORK CENTRAL RAILROAD COMPANY TRAIN 1/NY-4 EXTRA 2020 EAST AND TRAIN ND-5 EXTRA 5305 WEST HEAD-ON COLLISION NEW YORK CITY, NEW YORK MAY 22, 1967

The accident occurred on the West 30th Street branch of the New York Central Railroad at approximately 147th Street, New York, New York, at about 9:55 A.M. on May 22, 1967. The collision occurred on Track No. 1, which was being used that morning for train movement in both directions due to repairs which were being conducted on main Track No. 2. Six train service employees were killed, and three train service employees were injured. Six locomotives and 11 cars were destroyed, one locomotive extensively damaged and five cars were also damaged. The probable cause of this accident was the failure of the operator at the 72nd Street Station (DO) to restrict train ND-5.

National Transportation Safety Board Jan. 1968, 37 pp, 1 Fig.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

PB-190198, DOTL NTIS

12 071839
HIGHWAY-RAILROAD ACCIDENT REPORT: WATERLOO, NEBRASKA, PUBLIC SCHOOL BUS UNION PACIFIC RAILROAD COMPANY FREIGHT TRAIN ACCIDENT WATERLOO, NEBRASKA OCTOBER 2, 1967

At 8:10 A.M. on October 2, 1967, a school bus carrying 13 children to school, traveling east on County Road 29, near Waterloo, Nebraska, was driven across an unprotected highway grade crossing and was struck by a westbound Union Pacific Railroad freight train traveling at 56 m.p.h. The locomotive struck and held the right rear quarter of the bus dragging it backward, and then deflected it into a communications pole. The rear of

the bus body was disintegrated. Four of the children on the bus were killed and the other nine injured. There were no other fatalities or injuries in the accident. The probable cause of the accident was the failure of the school bus driver to ascertain that there was a train approaching the grade crossing and to hold his vehicle until the way was safe for passage.

National Transportation Safety Board Sept. 1968, 51 pp, Phots.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

PB-190204, DOTL NTIS

12 071941
AT DERAILMENTS-DON'T BECOME A PROBLEM OR A CORPSE
With the chemical industry growing at 6% to 7% annually, and up to 60% of this new exotic products, the problems of tank car damage in derailments are increasing. While most attention has been given to cars containing highly volatile flammable liquids and liquefied compressed gases, there are other commodities which are more deadly, though not so spectacular. At derailments it is essential to determine what each car contains, and what it last contained. Needed immediately is information on the behavior of chemicals with and without fire, and on their possible reaction with each other. The AAR has recommended ten steps for safe transportation of compressed gases to the National Transportation Safety Board in response to its request.

Presented in the Proceedings of the Seventy-eighth Annual Convention of the American Railway Bridge and Building Association, Chicago, Illinois, 17-19 September 1973.

Schlaf, ER (Illinois Central Gulf Railroad)
American Railway Bridge and Building Association Proceeding Sept. 1973, pp 44-55

PURCHASE FROM: American Railway Bridge and Building Association 18154 Harwood Avenue, Homewood, Illinois, 60430 Repr. PC

12 071942
STUDY OF WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY'S SAFETY PROCEDURES FOR THE PROPOSED METRO SYSTEM
Some of the identifiable high-risk areas of Metro that could benefit from a system safety review of the proposed system are outlined. The Safety Board recommends that WMATA develop the capability within its organization for system safety engineering and apply system safety principles to all aspects of the proposed Metro System to identify, assess, and correct those deficiencies identified by the analysis.

National Transportation Safety Board NTSB-RSS-70-1, Oct. 1970, 17 pp, 1 App

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-194365, DOTL NTIS

12 071991
RAILROAD SAFETY PRACTICE [Eisenbahnsicherungswesen]
A brief survey is presented concerning the development of safety installations for railroads starting with mechanical devices and going on to electronic equipment. New application domains for electronic circuits and process computers are discussed. [German]

Ernst, H (Technische Hochschule, Switzerland) *Association Suisse des Electriciens Bulletin* Vol. 65 No. 5, 03

ACKNOWLEDGMENT: EI (EI 74 900407)
PURCHASE FROM: ESL Repr PC, Microfilm

12 072461
RAILROAD ACCIDENT REPORT: PENN CENTRAL COMPANY COLLISION OF TRAINS N-48 AND N-49 AT DARIEN, CONNECTICUT, AUGUST 20, 1969
About 8:20 P.M. on August 20, 1969, Penn Central commuter trains N-48 and N-49 collided head-on just north of the Hoyt Street crossing on the New Canaan Branch, near Darien, Connecticut. The two trains involved in the accident consisted of self-propelled electrically-operated commuter type passenger cars. Train N-48, going from Stamford to New Canaan, had a three-man crew and about 60 to 80 passengers. The first car in train N-48 had been closed to revenue passengers before it left Stamford. Train N-49, a dead-head equipment train from New Canaan to Stamford, had a three-man crew and was carrying a car inspector and an electrician. A passenger, who was riding without authorization in the head car of N-48, and the engineer were killed. The conductor, flagman and about 40 passengers were injured. The conductor and flagman on train N-49 were killed and the engineer was seriously injured. The head cars of both trains were almost completely destroyed; other cars were less severely damaged. The Safety Board determined that the collision was caused by the operation of train N-48 beyond its meeting point in violation of properly issued train orders. Contributing to the cause of serious injuries and fatalities of the employees and the one passenger were: the design and location of the engineer's control compartment, the inability of the leading cars to withstand the force of the impact, and the location of the victims at the time of the collision in the forward area of the cars. Factors contributing to a great extent to the passengers' injuries were: the lack of restraining devices to hold the passengers in their seat, and the failure and movement of the seat backs.

National Transportation Safety Board NTSB-RAR-70-3, Oct. 1970, 65 pp, Figs., 4 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

PB-196053

12 072592
RAILROAD ACCIDENT REPORT: PENNSYLVANIA RAILROAD TRAIN PR-11A, EXTRA 2210 WEST AND TRAIN SW-6, EXTRA 2217 EAST DERAILMENT AND COLLISION DUNREITH, INDIANA, JANUARY 1, 1968
About 9:30 p.m., January 1, 1968, Pennsylvania Westbound freight train PR-11A, consisting of 98 cars and five-unit diesel-electric locomotive, was passing Dunreith, Indiana, at 42 miles per hour when the trailing wheels of the 88th car, an empty tank car, AESX 850, derailed at a broken rail near the eastern edge of the town. At the same time, eastbound freight train SW-6 consisting of a five-unit diesel-electric locomotive and 106 cars, was moving eastward at 32 miles per hour on the adjacent track. The derailed car in train PR-11A continued westward until it became disengaged from its trailing truck when it struck the crossing board at a grade crossing about 723 feet west of the point of original derailment. One or more cars collided with cars of hazardous materials moving in the opposite direction in SW-6's train, causing a general derailment and puncturing several tank cars of flammable materials. A large-scale fire ensued, followed by a violent explosion of a tank car of ethylene oxide forty-five minutes later. Immediately after the derailment and outbreak of fire the population of Dunreith was evacuated without injury. A cannery and several residences and businesses were destroyed. Three firemen and two police- men were slightly injured in the fire and explosion. The probable cause of the initial derailment in train PR-11A was the broken rail within the compromise joint where two different sizes of rail were joined. A contributing causal factor was the inadequate track maintenance which left the joint unsupported and allowed the development of the break in the rail. This initial derailment and the design of the lift-off type of center-pin connection between the truck and body of AESX car 850 which allowed the truck to separate from the car under impacts of a simple derailment, led to the secondary collision and general derailment.

National Transportation Safety Board No. SS-R-2, Dec. 1968, 73 pp, 11 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC

PB-190213, DOTL NTIS

12 072593
RAILROAD ACCIDENT REPORT: PENN CENTRAL COMPANY TRAIN SECOND 115 (SILVER STAR) DERAILMENT AT GLENN DALE, MARYLAND, JUNE 28, 1969
The "Silver Star" operating as Penn Central Train 2nd 115, derailed on Penn Central tracks at Glenn Dale, Md. about 1:23 p.m. June 28, 1969. Among the 541 passengers in the 18 cars, 144 persons were transported to area hospitals, 12 of whom were admitted. Total estimated damage, excluding personal injuries, were in excess of $300,000. The derailment was caused by lateral movement of the track under the train. The lateral movement was caused by buckling of the track because of high compressive

forces caused by heat expansion and the tendency of rail to creep in the direction of the predominant flow of traffic and descending grade. A number of injuries to passengers were caused by their being thrown from the seats and striking interior parts of the cars, and by luggage being thrown about inside the cars.

National Transportation Safety Board NTSB-RAR-70-1, June 1970, 43 pp, 6 Fig., 4 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-192456, DOTL NTIS

12 072658
RAILROAD ACCIDENTS AND NONDESTRUCTIVE INSPECTION
Railroad accident data published annually by the Office of Safety in the Federal Railroad Administration are analyzed to indicate the most severe causes of railroad accidents. The severity is judged by viewing both the frequency of accidents and the dollar damage per accident. Most of the components or conditions in the groups found to be severe accident causes are amenable to non-destructive inspection. An analysis shows the maximum benefits of an extensive non-destructive inspection program to appear in the wheel

This paper was contributed by the Rail Transportation Divison of ASME for presentation at the winter Annual Meeting, 17-22 November 1974, New York, New York.

Bray, DE (Oklahoma University)
American Society of Mechanical Engineers No. 74-WA/RT-4, June 1974, 15 pp, 3 Fig., 6 Tab., 59 Ref., 2 App.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

12 072710
RAILROAD ACCIDENT REPORT: DERAILMENT AND SUBSEQUENT BURNING OF DELAWARE AND HUDSON RAILWAY FREIGHT TRAIN AT ONEONTA, NEW YORK, FEBRUARY 12, 1974
This report describes and analyzes a derailment which occurred when a train separation resulted in unequal deceleration of the two parts of the train. Unusual lateral forces at the rear of the third locomotive unit canted the outside rail of a 3 degrees 30' curve outward enough to allow the wheels to drop inside. A tank car of propane was punctured and the ensuing fire impinged other tank cars and caused the violent rupture of three of them. Fifty-four person were injured by the fire and rocketing parts of tank cars. The National Transportation Safety Board determines that the probable cause of this accident was the inability of the track to resist the lateral forces which canted the outside rail outward and widened the gage of the track. These forces which were induced at the third locomotive unit resulted from the emergency application of the brakes when the train was separated between the third and fourth cars as it entered the 3 degrees 30' curve. The train separated as a result of the broken center sill on the fourth car.

This report contains Railroad Safety Recommendations R-74-31 through R-74-34.

National Transportation Safety Board NTSB-RAR-74-4, Oct. 1974, 25 pp, 4 Fig.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB 237336/3SL, DOTL NTIS

12 072729
PERSONAL SECURITY ON PUBLIC TRANSIT
While conventional modal choice models consider time and cost, safety has been largely ignored. This study examined the safety aspect of a public transit facility through user-perception survey. A bus and elevated line of the Chicago Transit Authority were chosen as the survey areas. It was found that the variable most frequently cited as decisive in using, or not using, the bus or elevated is freedom from personal attack or harassment. The users' perception of safety is examined. The study cites some shortcomings of the survey method and notes that system design should have a major role in persuading potential riders that safety is assured.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Ferrari, ND Trentacosts, MF (New York State Department of Transportation)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 214-223, 2 Fig., 8 Tab., Refs.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

12 072730
MARKING AND LIGHTING FOR PASSENGER TRAIN VISIBILITY
This investigation was to evaluate various alternative marking designs that could enhance the visibility of the trailing ends of passenger trains. The goal was one overall design that would be optimum during all operating conditions and yet be economical to implement and maintain. For daytime visibility, it was found that coverage and contrast were most important, with fluorescent yellow-orange most effective. At night reflective white stripes and large red marker lights were desirable. The recommended pattern was an inverted V-pattern of the yellow-orange and white stripes and markers on both sides of the lower part of the car end.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Hovind, M (Illinois Department of Transportation)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 177-186, 4 Fig., 6 Ref.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

12 080102
RAILROAD ACCIDENT REPORT: SOUTHERN RAILWAY COMPANY TRAIN 154 DERAILMENT WITH FIRE AND EXPLOSION LAUREL, MISSISSIPPI JANUARY 25, 1969
Southern Railway train 154 was wrecked at Laurel, Mississippi on January 25, 1969 at about 4:15 a.m., when 15 tank cars of liquefied petroleum gas derailed. The train, with four diesel-electric locomotive units, 139 cars and caboose was moving northward at about 30 mph when the west wheel on the lead truck of the 62nd car in the train broke. The wheel which broke as it was passing over the crossing of the Gulf, Mobile, and Ohio Railroad, derailed about 256 feet north of the crossing, and the train continued northward for about 2,146 feet before the 62nd car and 14 loaded tank cars behind it were derailed. Most of the tanks were mechanically damaged by the derailment resulting in an immediate violent eruption of fire and explosion. Two fatalities resulted from injuries caused by the fires and explosions after the wreck, 33 persons were hospitalized. Property damage in the town was extensive and total damage to Southern Railway track, equipment and lading was estimated at about $3,000,000.

National Transportation Safety Board 1969, 74 pp, Figs., Phots., 4 App.

ACKNOWLEDGMENT: National Transportation Safety Board
PURCHASE FROM: NTIS Repr. PC
PB-190208, DOTL NTIS

12 080115
METALLOGRAPHIC EXAMINATION OF SPECIMENS REMOVED FROM A SECTION OF TANK CAR IN SOUTH BYRON, NEW YORK DERAILMENT
The analysis presented in this report was conducted on the two specimens removed from shell plates. There are variations in banding, ferrite volume, blocky and acicular ferrite, but these represent normal variations in ingot freezing practice and rolling mill practice. None of these variations should result in significant differences in tensile rupture characteristics.

An RPI-AAR Cooperative Project.

Olson, LL
Association of American Railroads Research Center, (RA-03-2-4) R-127, Mar. 1971, 10 pp, 14 Fig., 12 Phot.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080116
METALLOGRAPHIC EXAMINATION OF SPECIMENS REMOVED FROM SECTIONS OF TANK CARS IN CRESCENT CITY DERAILMENT
Phase 03 report on Metallographic Examination of Specimens Removed from Sections of Tank Cars in Crescent City Derailment. Samples were removed for the purpose of later examination by fracture mechanics experts. In preparation for these later examinations and to insure against the possibility of an untimely later discovery of some important material shortcomings, a brief metallurgical examination was made of these specimens. The results are presented in this report.

An RPI-AAR Cooperative Project.

Reedy, CR Olson, LL Weston, RA
Association of American Railroads Research Center, (RA-03-1-2) R-125, Oct. 1970, 19 pp, 14 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080117
SEQUENCE OF EVENTS FOLLOWING CRESCENT CITY DERAILMENT
Phase 01 Report on Sequence of Events Following Crescent City Derailment. Report concerns only the behavior of the tank cars following the derailment. Further, there are no conclusions drawn since this would be premature and inconsistent with plan of doing so only after assembly and study of all past and current accident data.

Reedy, CR Olson, LL Weston, RA
Association of American Railroad Research Center, (RA-01-1-1) R-124, Aug. 1970, 19 pp, 11 Fig.

ACKNOWLEDGMENT: Association of American Railroads
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC, Microfiche

12 080219
GUIDELINES FOR ENHANCEMENT OF VISUAL CONSPICUITY OF THE TRAILING END OF TRAINS
The report summarizes a comprehensive study of potential means of reducing the probability of train-train collisions through enhancement of the visual conspicuity of the trailing end of trains. The basic function requirements and constraints for such devices are set forth, followed by a review of relevant past research. The form and parameter values of the warning system found to incorporate the best combinations of practicality and effectiveness are specified; in essence the system consists of clear xenon flash-tube beacons mounted on opposite sides of the car at the roofline, flashing simultaneously. Experimental use and observations of the system are described, and detailed recommendations are included.

Hopkins, JB
Transportation Systems Center, Federal Railroad Administration Final Rpt. DOT-TSC-FRA-74-8, Aug. 1974, 26 pp

ACKNOWLEDGMENT: NTIS (PB-236276/2SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236276/2SL, DOTL NTIS

12 080248
POLICING INTER-COMMUNITY MASS TRANSIT SYSTEMS: PROPOSED LEGISLATION FOR CHICAGO WITH A CONSIDERATION OF OTHER CITIES
The purpose of the report is to present model legislation that will require inter-community mass transit systems to be responsible for the safety of their passengers while using transit facilities. An effort is made to show why this legislation is necessary and how it is a solution to the present problem of high crime and low passenger safety on selected mass transit systems. In metropolitan Chicago, Illinois, as a selected example, the recent history is given (1967-1972) of the rise in transit crime and the apparent police response. The effects of the present multi-community policing are stated and explained. Some brief concluding remarks are presented.

Wallace, PS Buren, RM
Illinois University, Chicago, Illinois University, Chicago, Urban Mass Transportation Administration, (UMTA-IL-0024) Res. Rpt. RR-7, Mar. 1974, 62 pp

ACKNOWLEDGMENT: NTIS (PB-235677/2ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB 235677/2ST, DOTL NTIS

12 080279
OVERALL PROJECT SUMMARY REPORT
As a prerequisite to accomplishing the Project objective, over 4 man-years of effort were devoted to accumulating and analyzing accident data. Data on all accidents involving tanks cars were collected for the 6-year period 1965-1970, and for all major accidents back through 1958. The results of the accident review showed during the 1965-1970 period a loss of about $23.3 million was incurred due to product loss from tank cars that were punctured in accidents. About $15.4 million was caused by fire and about $7.9 million was attributable to non-fire causes. Careful attention was given to accidents involving tank cars that ruptured violently (vs. cars that were punctured) since these contributed primarily to the total losses. During the period from 1958 through 1970, a total of 113 cars ruptured violently, 41 during the single year of 1969. With this background the joint industry effort undertook numerous approaches to improving tank car safety with each appraised from a cost effectiveness standpoint. The various facets of the investigation are described with initial conclusions included. There are a series of detailed reports on the individual investigations available separately. A final report with added conclusions and recommendations is to be issued.

An RPI-AAR Cooperative Project.

Phillips, EA
Association of American Railroads Research Center, (RA-00-1-22) R-145, Oct. 1972, 65 pp, Figs.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080280
REPORT ON ANALYSIS OF TANK CAR TUB ROCKETING IN ACCIDENTS
The objective of Phase 12 of the RPI-AAR Tank Car Safety Project is to explain fundamentally the phenomena of tank car fracture behavior in accidents, particularly those fractures which led to violent ruptures. The Battelle Columbus Laboratories was engaged to conduct this research, and Battelle's final report on the study has been published under Report RA-12-2-20, "Phase 12 Report on Analysis of Fracture Behavior of Tank Cars in Accidents". The analysis explained the various fracture phenomena that have occurred and which have led to various tank rupture patterns. One type involves a fracture which runs longitudinally, then turns to a circumferential tearing shear fracture. This sometimes completely encircles the tank and creates a tank section open at the fractured end and closed at the other end by the tank head. The unreleased pressure acting on the closed end creates an unbalanced force on the "tub" and causes it to rocket. Battelle analyzed this rocketing phenomena and discusses the effectives on possible design changes which would offer the potential of reducing the distance travelled by the tubs, or eliminating the rocketing completely.

An RPI-AAR Cooperative Project.

Phillips, EA
Association of American Railroads Research Center, (RA-12-2-23) R-146, Dec. 1972, 52 pp, Figs., Tabs., Refs., 3 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080282
PRELIMINARY REPORT ON LABORATORY FIRE TEST APPARATUS FOR EVALUATING THERMAL SHIELD MATERIAL
RPI-AAR Report RA-01-2-7, "Summary of Ruptured Tank Cars Involved in Past Accidents," tabulated 84 cases of major ruptures and 14 cases of minor (local) ruptures of tank cars since 1958. Of these, the cause of rupture was known for 75 cases. Of these 75 cases, 66 were caused by fire impingement. As discussed in that report, there is strong evidence that most of these were a result of the unwetted (vapor space) steel being overheated and weakened. One method of reducing the probability of tank car ruptures due to fire exposure is to reduce the heat input to the steel with an intumescent paint, an ablative coating, a high temperature insulation, or some combination thereof. These are termed "Thermal shield materials" under the RPI-AAR Project, but, for brevity, will be called "coatings" in the remainder of this report. The original objective of the laboratory tests described in this report was to compare and screen

such coatings in order to find attractive candidates early in the program for selection for subsequent 1/5 and full scale fire tests. The test apparatus was designed to simulate the behavior of the unwetted steel portion of a tank car when exposed to fire. Most of the thermal coatings tested were obtained from commercially available sources. This report is a synopsis of the test work completed to date.

An RPI-AAR Cooperative Project.

Brown, F
Association of American Railroads Research Center, (RA-11-3-15) R-138, May 1972, 65 pp, Figs., Tabs., 4 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080283
REPORT ON ANALYSIS OF 1/5 SCALE FIRE TEST DATA
Under the RPI-AAR Phase II "Thermal Effects Study," a Series of 1/5 and full scale fire tests were conducted in cooperation with FRA. The tests were carried out at the White Sands Missile Range by personnel of the Naval Ordnance Laboratory. Under this cooperative arrangement, RPI-AAR is furnishing the 1/5 scale tanks and full scale tank cars, complete with lading, appropriate fittings and safety devices, and NOL is furnishing the instrumentation and providing the data reduction. Three tests were conducted on tanks constructed to a 1/5 linear scale of a nominal 33,500 gallon DOT 112A340W, tank car, except that full scale tank wall thickness was maintained, water was employed as lading in the first two tests, and propane was used in the third. All three tanks were bare (non insulated). Because of instrumentation difficulties in the water tests, all future 1/5 and full scale tests will be conducted with propane. This report covers an analysis of the results of the third (propane) test; analyses, results, conclusions and recommendations represent only the work and views of the RPI-AAR Project team and not those of DOT (FRA).

An RPI-AAR Cooperative Project.

Manda, L
Association of American Railroads Research Center, (RA-11-2-14) R-137, Apr. 1972, 37 pp, 18 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080292
REPORT ON TANK CAR ACCIDENT INVESTIGATION GUIDE. PHASE 12 REPORT
The purpose of this guide is to provide assistance to an investigator examining a tank car involved in a railroad accident and which ruptured or was punctured. The guide is intended to provide background information for the identification of fracture mode, the determination of the fracture origin and fracture pattern, and suggestions for the selection of samples for laboratory examination.

An RPI-AAR Cooperative Program.

Reedy, CE
Association of American Railroads Research Center, (RA-12-1-6) R-129, May 1971, 12 pp, 6 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080293
REPORT ON SUMMARY OF RUPTURED TANK CARS INVOLVED IN PAST ACCIDENTS. PHASE 01 REPORT
This report constitutes an extension and refinement of previously issued Report RA-01-2-3, "Summary of Ruptured Tank Cars Involved in Accidents-12/4/70." Damage to a tank in an accident, leading to loss of lading, can be divided into two main categories: (1) Punctures, tears, dents with peripheral cracks, etc., caused by an external impact and involving little or no crack propagation away from the area of impact. (2) Ruptures, or outwardly moved metal, involving the propagation, and sometimes branching, or a crack (or cracks). A crack, once initiated, may or may not propagate. The propagation phenomenon—or tank rupture—is influenced by many variables, including the amount of energy which is available in the system and properties of the tank material at its existing temperature. As a result many modes of rupture occur. A comprehensive analysis of this entire subject is being performed by Phase 12 research contractor, Battelle Memorial Institute, and no attempt will be made in this report to develop explanations for the various rupture modes. This report is organized as follows: All ruptured cars (113 since 1958) are divided into two categories—those involving cracks which remained within a heat-weakened area (18 cars—listed in Appendix B), and those involving crack propagation beyond the heat-weakened area, or in tanks having no heat-weakened area (95 cars—listed in Appendix A). The ruptures in these two categories were generally "local" and "major", respectively; so, for brevity these terms will be used in this report. The data in Appendices A and B are summarized in Table 1 through 10, in Sections II, III, IV and V of this report. No conclusions or recommendations are made, since the only objective of this report is to publish information which we have been able to derive from a large collection of records and photographs on this important subject.

An RPI-AAR Cooperative Project.

Weston, RA
Association of American Railroads Research Center, (RA-01-2-7) R-130, July 1972, 72 pp, Figs., Tabs., 2 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080295
REPORT ON SEQUENCE OF EVENTS FOLLOWING HOUSTON, TEXAS DERAILMENT. PHASE 01 REPORT
This report concerns only the behavior of the tank cars following the derailment. Further, there are no conclusions drawn since this would be premature and inconsistent with the plan of doing so only after assembly and study of all past and current accident data.

An RPI-AAR Cooperative Project.

Reedy, CE
Association of American Railroads Research Center, (RA-01-3-9) R-132, Oct. 1971, 13 pp, 3 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080296
REPORT ON DOLLAR LOSS DUE TO EXPOSURE OF LOADED TANK CARS TO FIRE, 1965-1970. PHASE 02 REPORT
The purpose of this study is to estimate the maximum probable savings that might be realized by preventing fire damage to loaded tank cars in accidents. This information will be used in the economic evaluation of the thermal shield systems being sought under Phase II.

An RPI-AAR Cooperative Project.

Weston, RA
Association of American Railroads Research Center, (RA-02-1-10) R-133, Feb. 1972, 35 pp, Figs., Tabs., 2 App.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080338
ACCIDENT REVIEW. PHASE 02 REPORT
This report summarizes the activities under Phase 02 of the RPI-AAR Railroad Tank Car Safety Research and Test Project. Phase 02 was concerned with the analysis of tank car accidents to determine the probability of lading loss from tank cars involved in accidents and the potential value of various design concepts that would reduce the probability of lading loss. This report summarizes the incidents of lading loss from tank cars due to mechanical damage incurred in accidents in the period 1965 through 1970, the available information on tank car utilization during this same period, and the various statistics on risk levels and loss experience that were derived from this data. The values of various design concepts are presented, and an analysis is made of the effect of overlapping effects

which would result from the implementation of more than one of the concepts.

An RPI-AAR cooperative program.

Weston, RA
Association of American Railroads Research Center, (T-5-1) Final Rpt. RA-02-2-18(R-141), Aug. 1972, 253 pp

ACKNOWLEDGMENT: Association of American Railroads Research Center
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080349
SAFETY EVALUATION OF MASS TRANSIT SYSTEMS BY RELIABILITY ANALYSIS

A problem-independent concept for the reliability analysis of complex systems is presented. A method of system reliability analysis which is based on a selection of generally applicable mathematical models and computer programs for efficient numerical evaluation of the models emerges from this concept, general safety model based on the same reliability analysis techniques and procedures is presented. A case study shows the application of the safety models and the methods of reliability analysis.

Frey, HH *IEEE Transactions on Reliability* Vol. R-23 No. 3, Aug. 1974, pp 161-169

ACKNOWLEDGMENT: EI (EI 74 080415)
PURCHASE FROM: ESL Repr. PC, Microfilm

12 080371
REPORT ON FEBRUARY 9, 1974, ACCIDENT INVOLVING TYPE E TOP AND BOTTOM SHELF COUPLERS (4/22/74). PHASE 10 REPORT

While it has not been within Project policy to issue reports on specific accidents, a second derailment has occurred which involved the Type E top and bottom shelf coupler (The previous derailment occurred on July 1, 1973 and is reported on in RA-10-3-25, dated 12/11/73) and is of sufficient interest to warrant departure from policy. The performance of these "shelf" couplers in accidents is of vital interest in view of the Project recommendation (ref. Section VI, Report RA-00-1-22) that all new tank cars and certain existing ones be equipped with these couplers to reduce the probability of head punctures, whereas the previous derailment involved a hopper car so equipped (L&N 191421). The car is one of 225 cars which have been in trial service to determine if any problems exist with these couplers in normal railroad operational environment, satisfactory performance being a prerequisite to adoption of the Project recommendations. Conversely, it was not expected that sufficient derailments would occur with 225 cars to make the prime objective of this trial service one of evaluating the couplers' performance in the derailment environment; however, since a second accident has occurred, it is obviously worthy of careful review.

An RPI-AAR Cooperative Project. Direct requests to the Project Director's Office, Earl Phillips.

Phillips, EA
Association of American Railroads Research Center, (RA-10-4-28) R-159, Apr. 1974, 13 pp

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080372
REPORT ON JULY 1, 1973 ACCIDENT INVOLVING TYPE E TOP AND BOTTOM SHELF COUPLERS (12/11/73). PHASE 10 REPORT

While it has not been within Project policy to issue reports on specific accidents, a derailment on July 1, 1973 near Romney, Ky. is of sufficient interest to warrant departure from policy. This derailment involved a tank car equipped with Type E top and bottom shelf couplers (hereinafter referred to as "Shelf couplers"). The performance of these couplers in accidents is of vital interest since the Project has recommended that all new tank cars and certain existing ones be equipped with these couplers to reduce the probability of head punctures. The involved car, UTLX 59641, is one of 225 cars which have been equipped with the shelf couplers under a trial service program. The objective of this program is to determine if any problems exist with these couplers in normal railroad operational environment, satisfactory performance being a prerequisite to adoption of the Project recommendations. Conversely, it was not an objective to determine the couplers' performance in the derailment environment; however, since the accident has now occurred, it is obviously worthy of careful review.

An RPI-AAR Cooperative Project. Direct requests to the Project Director's Office, Earl Phillips.

Phillips, EA
Association of American Railroads Research Center, (RA-10-3-25) R-154, Dec. 1973, 15 pp, 11 Fig., 9 Phot.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080373
REPORT ON ANALYSIS OF 1/5 SCALE FIRE TESTS (12/12/73). PHASE 11 REPORT

Phase 11 of the RPI-AAR Project has addressed the question of tank car exposure to fire environments with the ultimate objective of developing cost-effective methods of reducing the probability of tank car ruptures in fires. By means of accident investigations, tests, and theoretical analyses, this study has sought to determine both the characteristics of the fire environment and the tank car response to fire exposure, including the assessment of thermal stresses. The study has emphasized the Class DOT 112A and 114A non-insulated cars since they have been involved in more significant accident loss cases. The several Phase 11 activities have included a series of laboratory fire tests conducted on plates simulating tank car steels and field fire tests conducted on 1/5 scale and full scale tank cars. The purpose of these tests has been to: 1. Study a single type of fire (i.e., the all-enveloping fire); 2. Characterize the response of 112A/114A type tank cars to the all enveloping fire; and 3. Evaluate representative state-of-the-art thermal protection systems (coatings) which might be applied to such cars. In addition to the above, the data from the 1/5 scale and full scale field tests will be used to improve a computer program which has been developed to predict the transient pressure/temperature histories of 112A/114A tank cars exposed to a variety of fires, including the all enveloping type. The data will also be used to improve the laboratory fire test apparatus. Both the computer program and laboratory test will be used in the development of performance requirements and specifications for candidate thermal shield materials. A specific purpose of the 1/5 scale tests has been to prepare for the full scale tests by gaining preliminary knowledge of the fires, instrumentation techniques, methods of data reduction and analysis, and the behavior of several thermal shield materials. The complete series of fire tests has consisted of seven (7) 1/5 scale and two (2) full scale tests, all conducted in cooperation with the DOT, FRA. These tests were performed at the White Sands Missile Range, initially by personnel of the Naval Ordnance Laboratory (NOL) and subsequently by the Ballistics Research Laboratory (BRL) under contract to the DOT (FRA). Under this cooperative arrangement the RPI-AAR furnished the 1/5 scale tanks and the full scale tank cars complete with lading, appropriate fittings and safety devices. The NOL (later BRL) provided the instrumentation, conducted the instrumentation, conducted the tests, and furnished reduced data. The report presented here analyzes the data obtained from the seven (7) 1/5 scale tests. The two (2) full scale tests will be treated in a subsequent report. All seven (7) tanks were constructed to a 1/5 linear scale of a nominal 33,500 gallon DOT 112340W tank car, except that the full scale shell thickness and safety valve were maintained. Figure A is a sketch of the 1/5 scale tank and the typical instrumentation and test setup. It is emphasized that the results, and particularly the conclusions, presented here apply only to the 1/5 scale tanks, and should not be extrapolated to the full scale case. Moreover, it is emphasized that this report represents only the analyses and views of the RPI-AAR Project, and does not necessarily reflect those of the DOT (FRA).

Phillips, EA Manda, L
Association of American Railroads Research Center, (RQ-11-5-26) R-155, Dec. 1973, 41 pp, 25 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

12 080426
EXPLOSION HAZARDS ASSOCIATED WITH SPILLS OF LARGE QUANTITIES OF HAZARDOUS MATERIALS. PHASE I
The report documents the results of Phase I of a program whose object is to quantify the explosion hazards associated with spills of large quantities of hazardous material such as liquefied natural gas (LNG), liquefied petroleum gas (LPG), or ethylene. The principal results are (1) a phenomenological description of a spill, (2) an examination of the detonation properties of methane, (3) a qualitative theory of non-ideal explosions, and (4) a plan for Phase II of the study.

Lind, CD
Naval Weapons Center, United States Coast Guard Final Rpt. Oct. 1974, 63 pp

Contract DOT-CG-34095

ACKNOWLEDGMENT: NTIS (AD/A-001242/7ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-001242/7ST, DOTL NTIS

12 080647
INVESTIGATION OF THE FEASIBILITY OF THE DELPHI TECHNIQUE FOR ESTIMATING RISK ANALYSIS PARAMETERS
An assessment was made of the feasibility of establishing by subjective estimates inputs for a previously developed risk analysis model. The model combines data on the likelihoods and costs of accidents that could arise in the transportation of hazardous materials. It thereby develops a measure of risk suitable for comparisons of possible alternate means of transportation. This can provide information of value to decision-making on transportation safety regulations and special permits.The present report covers the potential for this augmentation through organized surveys of experts following the procedures of the Delphi technique. The Delphi experiment that was conducted is described in detail and its results, concerned with alternate means of transporting hydrogen sulfide, are presented. A Bayes procedure for combining such results with any statistical accident data that may become available is also defined.

Prepared in cooperation with Department of Transportation, Washington, D.C. Office of Hazardous Materials.

Philipson, LL
University of Southern California, Department of Transportation Final Rpt. RAPO-74-501, Apr. 1974, 177 pp

Contract DOT-OS-20114/1

ACKNOWLEDGMENT: NTIS (PB-236774/6ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236774/6ST, DOTL NTIS

12 081203
AN EVALUATION OF FIVE RAILROAD ENGINE ALERTING AND WARNING LIGHT SYSTEMS
Five lighting systems proposed for improved other-vehicle operator approach warning alerting were evaluated in a simulated grade crossing decision paradigm. Additional evaluations were conducted on system conspicuousness. The systems, a Bicolor Radial Beacon, Slow-rate Strobe 2.5 flash per second (FPS), Fast-rate Strobe 1 FPS, truck clearance lights, and side mounted Flourescent Panels, were examined at 10, 20, 30 miles per hour under daylight and night conditions. Some advantage was found for the strobe systems and for the clearance lights as compared to the usual fixed locomotive headlight. Recommendations for further research were made. (Author)

Sanders, MS Aylworth, CE O'Benar, JD
Naval Ammunition Depot NAD-CR-RDTR-265, Feb. 1974, 81 pp

ACKNOWLEDGMENT: NTIS (AD-779878/8GA)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-779878/8GA, DOTL NTIS

12 081255
STATISTICAL INQUIRY ON ELECTRICAL ACCIDENTS WHICH OCCURRED ON THE FS DURING THE YEARS 1970-72 AND CRITERIA FOR THEIR PREVENTION [Indagine statistica sugli infortuni elettrici occorsi nel l'azienda F.S. nel triennio 1970-1972 e spunti de prevenzione]
No Abstract. [Italian]

Velino, C Dominici, R *Ingegneria Ferroviaria* Vol. 29 No. 2, Feb. 1974, pp 110-119, 7 Fig., 13 Tab., 16 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1105)
PURCHASE FROM: ESL Repr. PC, Microfilm

13 052557
APPLICATION OF THYRISTORS IN RAILWAY TECHNOLOGY: CONSEQUENCES AND REMEDIES. INVESTIGATION OF THE EFFECTS OF HARMONICS IN CATENARY CONTACT WIRES ON HIGH VOLTAGE SUPPLY NETWORKS
This report contains the measurements and conclusions thereof on the effects of the harmonics on the overhead contact system (25 kV) of the Hungarian State Railways on the 120 kV high voltage power supply network. These measurements are to establish whether the statement by the ORE Committee A 38 on the operation of rectifier locomotives that: a three-phase energy distribution network can be regarded as symmetric, despite the single-phase railway loading, when the asymmetry of voltage does not exceed 3% (this value is not exceeded provided that the traction load does not account for more than 4 or 5% of the short circuit power in the energy distribution network) is also applicable to the operation of thyristor locomotives. Based on the investigations it can be established that the value of 4-5% permissible for diode rectifier locomotives must be reduced under the prevailing conditions as the voltage distortion generated by thyristor locomotives is approximately three times greater than that of diode locomotives. Together with the summary of the results this report contains a calculation method for determining the relation between corresponding harmonics on the 25 kV and 120 kV sides, which is sufficiently accurate for practical use.

International Union of Railways A122/RP 14/E, Apr. 1974, 35 pp, 47 Fig., 3 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

13 057416
FEASIBILITY AND CONVENIENCE OF 6000 V DIRECT CURRENT ELECTRIC TRACTION [Fattibilita' e convenienza della trazione elettrica in corrente continua a 6000 v]
Results of a study of the feasibility and advantages of a changeover from 3 kV to 6 kV dc electric traction on Italian State Railroads are presented. The scope and methods of the study are described. Specific problems, connected with voltage increase, and affecting contact lines, power substations, motors and converters, and signaling are discussed. This theoretical investigation shows the possibility of transition to 6 kV traction. Finally, economic costs of such a transition are evaluated. [Italian]

Barenghi, F Fiocca, F Gambassi, F Giagnoni, C *Ingegneria Ferroviaria* Vol. 28 No. 10, Oct. 1973

ACKNOWLEDGMENT: EI (EI 74 604261)
PURCHASE FROM: ESL Repr PC, Microfilm

13 057425
ELECTRIFICATION OF THE RAILROAD LINE BETWEEN THE RIVERS SAAR AND MOSELLE [Die Elektrifizierung der Saar-und Moselstrecke]
A 200-km long line between Saarbruecken and Koblenz, operated by the West German Railroad System is described. The importance of the line as well as its development and special features are discussed. Start of operation was scheduled for the beginning of 1974. [German]

Heidinger, M Behmann, U Zillessen, O *Elektrische Bahnen* Vol. 44 No. 11, Nov. 1973, pp 242-253, 6 Ref.

ACKNOWLEDGMENT: EI (EI 74 603105)
PURCHASE FROM: ESL Repr PC, Microfilm

13 057483
BN GETS ELECTRIFICATION STUDY RESULTS: GE SEES BEGINNING OF NEW RAIL ERA
A year long study on electrification by the Burlington Northern Railroad was turned over to management in May. The study covered a 1200 mile area stretching from Billings, Montana to Lincoln, Nebraska. Although the installation costs may be as high as $100,000 per mile, considerable savings are expected in operating costs.

Modern Railroads Vol. 29 No. 6, June 1974, p 21

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

13 057709
ELECTRIFIED MAINLINE SOON WILL BE A CANADIAN REALITY
The increasing cost of fuel and the shortages that will occur will force Canadian railways to electrify their main lines within 10 years. The Canadian Pacific has done extensive tests on electrification and estimates that the 650 miles from Calgary to Vancouver could be converted for about $200 million, including new locomotives. However, other lines, such as Windsor to Montreal, are being considered as the first routes for electrification because construction would be simpler.

Canadian Transportation & Distribution Management Vol. 77 No. 5, May 1974, pp 39

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Southam Business Publications Limited 1450 Don Mills Road, Don Mills M3B 2x7, Ontario, Canada Repr. PC

13 057720
MAIN LINE ELECTRIFICATION COMING SOON? PART I
Four major reasons for possible main-line electrification in North America and three possible objections are discussed. The utility industry has begun to look on rail electrification as a potential market; railroads are interested in the potential increase in line capacity; high-voltage technology improves the economics of electrification; and there are ecological benefits. While U.S. railroads remain under private ownership, the economic factors predominate. This is Part I of two-part special report.

Shedd, T *Modern Railroads* Vol. 26 No. 5, May 1971, pp 40-43

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

13 057721
ELECTRIFICATION—THE NEW TECHNOLOGY. PART II
Power systems, types of catenary and solid state devices for power and control circuits of locomotives have changed some of the traditional objections to electrification. In electrification planning, there must be economic trade-offs. While current electrification technology has progressed beyond what was available when the last major U.S. system was installed, both U.S. and Canadian railroads are hesitating to make the commitment. This is Part II of a two-part special report.

Shedd, T *Modern Railroads* Vol. 26 No. 5, May 1971, pp 44-48

PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

13 057859
DEVELOPMENT OF EQUIPMENT FOR PREVENTING THE ADHESION OF ICE OR SNOW TO CONTACT WIRE
For preventing the adhesion of ice or snow to contact wire, an autotransformer feeding circuit feeds the shorted circuit between up-line and down-line contact wire sectioned by the autotransformer. In March 1973 field tests were carried out in the area between Shirasawa and Yunosawa in the Ohu main line. In this report, the outline of the installation, results of the tests, theoretical investigations and the power characteristics of this feeding circuit if this system were to be applied to a nationwide Shin Kansen network are discussed.

Mizuno, J Ariizumi, S Toda, H *Railway Technical Research Institute* Quart. Rpt Vol. 15 No. 2, 1974, pp 81-82

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

13 071777
OPERATION OF ELECTRIC TRAINS OF THE WEST GERMAN RAILROAD SYSTEMS IN 1973 [Der Elektrische Zugbetrieb der Deutschen Bundesbahn im Jahre 1973]
A general survey is presented which is concerned with energy sources, particularly petroleum, used to operate the railroads. Progress made in the electrification of railroad lines is outlined, along with developments of electric locomotives and electric motor vehicles. Power supply systems and testing installations are described. Cooperation is international and domestic engineering organizations, such as IEC, are reported. [German]

Bauermeister, K *Elektrische Bahnen* Vol. 45 No. 1, Jan. 1974

ACKNOWLEDGMENT: EI (EIX740801951)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071779
110-MW RAILROAD TURBO SET IN THE LARGE POWER PLANT OF MANNHEIM, WEST GERMANY [Der 110-MW-Bahnturbosatz im Grosskraftwerk Mannheim]
The installation of the fifth turbo set at the Mannheim power plant is reported. This augmented the available electric power of the West German railroads to 1300 mW, of which about 60% is generated in steam power plants. The electric and mechanical equipment is described.

Duffert, H Memmel, K *Elektrische Bahnen* Vol. 45 No. 2, Feb. 1974, pp 26-31, 8 Ref

ACKNOWLEDGMENT: EI (EIX740801953)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071791
PRESENT SITUATION OF STUDIES ON THE POSSIBILITY AND OPPORTUNITY OF THE USE OF 6 KV ELECTRIC TRACTION DC [Stato Attuale degli Studi Sulla Fattibilita e Sulla Convenienza della Trazione Elettrica con Corrente Continua a 6 kV]
The increase in the power absorbed by trains on the main railroads presents complicated problems for dc electric traction. The article explains late studies, many of which were performed in collaboration between the F.S. and the ANIE, that have answered favorably the question of is it advantageous to increase the tension in the contact line beyond the present 3 kV. [Italian]

Mayer, L *Elettrotecnica* Vol. 61 No. 3, Mar. 1974

ACKNOWLEDGMENT: EI (EI 74 803014)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071804
STRIP MINE NAVAJO BLACK MESA COAL, SHIP BY AUTOMATED RAILROAD TO PLANT
Peabody Coal company, largest United States coal miner, has expanded its Arizona strip mining operations to supply 27,000 tons of coal per week to a new electric power generation plant. The bituminous, 11,000 BTU per pound coal has an ash content of 8.0 percent and a sulphur content of only 0.5 percent to make it ideal for steam generation. Coal from the new No. 2 mine rides to the Navajo Generating Station over a new conveyor belt and a 78-mile-long electrified and automated railroad. Coal is loaded into 122-ton capacity hopper cars near the mine and transported 78 miles by the Black Mesa and Lake Powell Railroad. International Engineering Company, Inc., of San Francisco, California, designed the railroad to use a highly efficient 50-kilovolt alternating-current power system which uses twice the voltage of any previous railroad system. Because of the high voltage, the system required only one power substation, which was much cheaper than the three or four that would ordinarily have been needed. The design also permitted IECO to use a lightweight catenary system to transmit current to the locomotives, which also saved money. Three new electric locomotives, each of 6,000 rail-rated horsepower, were manufactured by General Electric to pull the 83-car train along the new line's standard-gauge tracks, from 35 to 55 miles per hour.

World Mining Vol. 27 No. 6, June 1974

ACKNOWLEDGMENT: EI (EI 74 806204)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071811
MITIGATION OF INDUCED AC ON A BURIED OIL PIPELINE ALONG POWER LINE RIGHT-OF-WAY
Large lateral space between the pipeline, tower footings and overhead cable minimized resistive and inductive coupling. Ungrounded or non-backfilled pipe posed potential hazards. Results also indicated that above-grade metal structures should not be located close to tower footings, and the use of nonmetallic materials should be considered whenever possible.

Robinson, HC (Interprovince Pipe Line Limited); Rog, JW *Materials Protection and Performance* Vol. 13 No. 5, May 1974

ACKNOWLEDGMENT: EI (EI 74 702466)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071974
ESTIMATION OF SAFETY CONDITIONS AND CURRENT PROTECTION OPERATION DURING DISCONNECTING THE AC CONTACT CIRCUIT TOWERS FROM THE RAILS [Otsenka Uslovii Elektrobezopasnosti i Raboty Tokovoi Zashchity Pri Otosedinenii Opor Kontaktnoi Seti Peremennogo Toka ot Rel'sov]
A method to calculate current distribution in an ac contact circuit is proposed for the case when insulation damage occurs at a tower disconnected from the rails. [Russian]

Kosarev, BI (Moscow Institute of Railroad Transportation Eng); Zel'vyanskii, YA *Electric Technology* No. 3, Mar. 1974, pp 32-36, 4 Ref

ACKNOWLEDGMENT: EI (EI 74 903071)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071976
CABLES AND FIRE HAZARD [Cavi e pericolo d'incendo]
After describing experiments conducted on a cable in which flame cannot be propagated, other dangers that can derive from the cables in case of fire are examined. Besides the fire propagation, the toxicity and the opacity of fumes spread out from the cables burning are particularly examined, as well as the Oxygen Index measure with respect to its utilization as quality control during production.

Zanelli, C (Ind Pirelli, Italy); Philbrick, SE Beretta, G *Elettrotecnica* Vol. 61 No. 4, Apr. 1974, pp 361-365, 5 Ref

PURCHASE FROM: ESL Repr PC, Microfilm

13 071977
OVERHEAD EQUIPMENT AND CURRENT COLLECTION AT SPEEDS FROM 160 TO 300 KM/H
This paper describes the results of investigations on the interaction of the overhead equipment and the various modern pantographs at speeds of 160 to 300 km/h. Recommendations are given for reliable and effective current collection for three speed ranges: up to 160 km/h, up to 200 km/h, and for 250-300 km/h. It is shown that to ensure normal current collection at speeds up to 160 km/h, relatively small modifications of the overhead are required. As for running at speeds up to 200 km/h on existing electrified lines, the problem may be solved by using improved types of pantographs with a small reduced weight.

Goroshkov, JI (Central Railway Research Institute, USSR) *Rail International* No. 5, May 1974, pp 369-390, 19 Ref

ACKNOWLEDGMENT: EI (EI 74 903049)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071982
HEATING OF OVERHEAD CONTACT WIRES IN ELECTRIC RAILROAD SYSTEMS [Fahrdrahterwaermung beim Elektrischen Zugbetrieb]
An analysis is made of the temperature rise caused by the alternating currents of the electric locomotives. The temperature variations with respect to both time and distance are considered. The analysis considers the thermal response in case of one-sided and two-sided power supply of the contact wire, while one or several electric locomotives travel on the line. The basic process associated with heating up of a wire due to a constant current is clarified. [German]

Held, O *Elektrische Bahnen* Vol. 45 No. 4, Apr. 1974

ACKNOWLEDGMENT: EI (EI 74 902386)
PURCHASE FROM: ESL Repr PC, Microfilm

13 071990
MEASUREMENT OF SOME DYNAMIC CHARACTERISTICS ON OVERHEAD EQUIPMENT FOR RAILWAY ELECTRIFICATION
An attempt is made to obtain the approximate dynamic admittances at some characteristic points on overhead equipment. The results of a preliminary study on the measurements of the high frequency vibration components on scaled overhead equipment are presented.

Institute of Electrical and Electronics Engrs Proc Vol. 121 No. 2, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 900912)
PURCHASE FROM: ESL Repr PC, Microfilm

13 072459
INITIAL CORROSION SURVEY OF THE BAY AREA RAPID TRANSIT SYSTEM
The 75-mile (120-km) Bay Area Rapid Transit System has a dc traction power supply that uses the continuously welded steel running rails for its negative current return. The rails are mounted on insulating fasteners to minimize leakage current. However, high values of stray current have been measured during the initial operation of the system. Testing has demonstrated that the negative return grounding at traction substations and its interconnection with other grounding has been the major cause of stray earth currents. An alternate method of negative return grounding through diodes has been tested and is being installed. The diodes block exchange currents, but allow leakage and fault current return to the traction rectifiers.

Transportation Research Record No. 500, 1974, pp 45-49, 2 Fig.

PURCHASE FROM: TRB Repr. PC

13 072477
THE DESIGN AND OPERATION OF THE BART POWER SYSTEM
This paper contains a general description of the electrical power distribution facilities serving the Bay Area Rapid Transit system. Included are the systems supplying power to both the fixed facilities and the traction vehicles, but concentrating on the latter. Emphasis is placed on features that provide realiability and continuity of service.

Miller, RH (Bay Area Rapid Transit District) *IEEE Transactions on Industry Applications* Vol. IA10 No. 5, Sept. 1974, pp 560-566, 1 Fig.

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications
PURCHASE FROM: ESL Repr. PC, Microfilm

13 072478
COMPUTER EVALUATION OF OVERHEAD EQUIPMENT FOR ELECTRIC RAILROAD TRACTION
The mathematical models and associated computer programs for analyzing a number of designs of overhead equipment such as simple catenary, compound catenary, stitched catenary, tunnel equipment, and single-wire system, together with many possible variations are described. The programs are able to deal with up to four pantographs, and the initial conditions assumed are that the wires have their static equilibrium configurations and that the front pantograph is at the beginning of the first span touching the contact wire (or trolley wire) and moving tangentially to it. Any subsequent pantographs reach the beginning of the equipment after the start of the run and are then dealt with appropriately. The output of the programs list the input data, the total percentage contact loss between the panhead and contact wire in each span and the pantograph heights and contact forces at appropriate intervals of time. Graph plots of the pantograph heights and contact forces are also produced. The resutls of these programs are shown to give satisfactory agreement with previously published results obtained on a scaled model.

Scott, PR Rothman, M (British Insulated Callender's Cables Limited)
IEEE Transactions on Industry Applications Vol. IA10 No. 5, May 1974, pp 573-580, 6 Fig, 10 Ref.

ACKNOWLEDGMENT: IEEE Transactions on Industry Applications
PURCHASE FROM: ESL Repr. PC, Microfilm

13 072497
RAPID TRANSIT—THERE'S AN ELECTRIC BILL TO PAY
This paper presents an argument for total system planning, prior to introducing new vehicles into a rapid transit system. The electric bill can be overlooked in planning, but soon becomes a shocking reality. Benefits and detriments to the electric system through operation of vehicles with various characteristics is discussed.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Davis, JR (Gibbs and Hill, Incorporated)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A) Proceeding Part 1, 1974, pp 315-317

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

13 072574
ENERGY ASPECTS OF RAIL ELECTRIFICATION
It is concluded that electrification can assist the U.S. in moving toward a goal of energy self-sufficiency, at the same time deriving better control of railroad costs and improving railroad operating efficiency. Comparisons of electric and diesel traction investments and overall costs indicate that railroads would not only derive operating savings and benefits, but also reduce diesel fuel consumption by over 50 percent if wide scale electrification were to be adopted. There would be associated balance of payment and national security benefits to the nation and price stability benefits to the railroads. This stability would come with increasing use of coal and nuclear generated electric energy.

Proceedings of the conference held at the University of Wisconsin, May 6-8, 1974, sponsored by the Federal Railroad Administration and the Wisconsin Department of Transportation contained in "The Role of U.S. Railroads in Meeting the Nation's Energy Requirements."

Ross, BA (American Electric Power Service Corporation)
Wisconsin University, Madison Proc Paper Oct. 1974, pp 41-46

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Wisconsin University, Madison Graduate School of Business, Madison, Wisconsin, Repr. PC

13 072575
ECONOMICS OF ELECTRIFICATION
Economics serves to allocate scarce resources and the pricing system serves to drive the energy of economics. In the railroads' weighing of two options, electrification or continuation of diesel operation, the author introduces what he terms the Corporate Hurdle Rate, a return sufficiently above the weighted incremental cost of capital so that new investments at this level will overcome the low earnings of present sunk investments. He notes that the economics of two options should be analyzed and if there is an acceptable option, then the cheapest source of financing should be secured. Introduced also is the technological risk factor. Finally the author speculates on whether the only choices should be diesel or electric operation.

Proceedings of the conference held at the University of Wisconsin, May 6-8, 1974, sponsored by the Federal Railroad Administration and the Wisconsin Department of Transportation contained in "The Role of U.S. Railroads in Meeting the Nation's Energy Requirements."

Michon, AE (Burlington Northern)
Wisconsin University, Madison Proc Paper Oct. 1974, pp 37-40, 5 Fig.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Wisconsin University, Madison Graduate School of Business, Madison, Wisconsin, Repr. PC

13 072784
USE OF DIGITAL COMPUTER FOR CALCULATING THE POSITION OF THE CONTACT WIRE AND THE SYSTEM HEIGHTS [Berechnung der Fahrdrahtlage und der Systemhoehen mit dem Digitalrechner]
The correct relation between the inclination chosen for the contact wire and the increase of system height is emphasized, which must be observed in order that a perfect position of the contact wire can be secured in lowered chaingear contact lines of electric railways. A mathmetical relationship is defined and illustrated by an example. A universal flow chart and a machine program in FEL-ALGOL are mentioned for the digital computation of lowering a supporting cable within the reach of a bridge. [German]

Altmann, S *Elektrie* Vol. 28 No. 6, June 1974, pp 330-333, 3 Ref.

ACKNOWLEDGMENT: EI (EI 74 069536)
PURCHASE FROM: ESL Repr. PC, Microfilm

13 072785
INTERFERENCE IN RAILROAD ELECTRIFICATION
In the electrification of any railroad, the design engineer is faced with many problems related to proper operation of communication and railroad signal systems. The factors cited above are dominant and, because they are interrelated, support the obvious conclusions of basing the design of electrification on a systems approach.

Robertson, HM (Association of American Railroads)
National Telecommunications Conference Cong. Rec. Vol. 2 Proc. Paper #25c, 1973, 3 pp, 22 Ref.

ACKNOWLEDGMENT: EI (EI 74 069532)
PURCHASE FROM: IEEE Repr. PC

13 072941
THE MANAGEMENT OF AN ELECTRIFIED RAILROAD
Penn Central is the only survivor of first-generation electrifications and survives because of the same reasons that second-generation U.S. electrifications might be built, high traffic density and speed. Costs are cited for PC's locomotive maintenance and for catenary. Results of electrified operation of the Japanese National Railways and Swedish State Railways are also discussed. The Swedish experience includes financial statistics for operation of the Narvik-Kiruna iron ore line which is comparable to North American operations in terms of its tonnages and train sizes.

Harley, ET (Penn Central Transportation Company); Misaka, K (Japanese National Railways); Wenning, B (Swedish State Railways) *Railway Management Review* Vol. 74 No. 2, 1974, 25 pp, 21 Fig.

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072942
FINANCING RAILROAD ELECTRIFICATION
Conventional financing will not work for railroad electrification because of the general lack of borrowing power of the industry. In the face of an ever-deepening morass of railroad liquidation, the U.S. government represents even a difficult source of capital. The author sees the evolution of a two-tier industry—the financially viable and the perpetually bankrupt. Regulatory restriction can tend to swell the latter group, stiffling electrification and other worthwhile capital projects. In the private sector, the author urges consideration of possible financing by users of freight service, utilities and/or manufacturers of the components used in electrification. A rationalized U.S. rail plant would be important in any U.S. electrification.

Hampton, RN (Salomon Brothers) *Railway Management Review* Vol. 74 No. 2, 1974, pp A78-A81

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072943
PLANNING FOR RAILWAY ELECTRIFICATION
Railroads considering electrification should prepare a development program covering at least 20 years which can be periodically reviewed and made to indicate those routes which may even possibly be considered for electrification. Such plans enable new works such as bridges, cable laying and power line crossings to be installed in conformity with desired electrical clearances. The transition from diesel to electric traction must also be planned comprehensively.

Lyon, EC (British Railways Board) *Railway Management Review* Vol. 74 No. 2, 1974, pp A64-A77, 3 Fig., 2 Tab.

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072944
MAKING AN ECONOMIC EVALUATION OF RAILROAD ELECTRIFICATION
While there have been rules of thumb to judge the economics of an electrification project, a computer program has been developed which takes into account 20 factors essential in such appraisal. Answers are expressed on a present net worth basis and the point in time at which economies of electrification offset its higher net cost. The paper devotes attention to factors which are most difficult to assess—capital investment in motive power and operating costs, the cost of right-of-way installations and their maintenance costs. The computer printout indicates costs for each year over a 30-year period and can be up-dated with the insertion of revised information.

Foley, EP (Gibbs and Hill, Incorporated) *Railway Management Review* Vol. 74 No. 2, 1974, pp A46-A63

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072945
THE BENEFITS OF RAILROAD ELECTRIFICATION
After noting that conditions vary considerably in different countries and even on different railroads in the same country, the author/observes that British experience should be applicable and useful in the U.S. While conceding that freight traffic characteristics differ substantially, it is noted that Britain has experienced increased passenger revenues because of the effects of electrification on both interurban and suburban passenger operations. In addition to generating new traffic, operations have been improved and staff reduced. There are also socioeconomic benefits. The author warns that stop/go policies can increase the overall cost of electrification.

Bowick, DM (British Railways Board) *Railway Management Review* Vol. 74 No. 2, 1974, pp A37-A45

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072946
RAILROAD ELECTRIFICATION TODAY
An overview of railroad electrification throughout the world is combined with a state-of-the-art appraisal. After pointing to the technical innovations which have come out of Europe, the author notes that there are differences between European and North American railroading which account for some of the basic differences to approaching motive power design in the two areas. Studies have shown that North American electrification can be justified economically on major sections of heavy-volume freight mainlines which account for about 10 per cent of U.S. route mileage. While this would represent a heavy capital investment, high volume railroads are said to be able to realize up to a 25 percent discounted rate of return.

Hamilton, SG (General Electric Company) *Railway Management Review* Vol. 74 No. 2, 1974, pp A15-A36, 31 Fig.

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072947
ELECTRIC ENERGY FOR TRANSPORT IN THE IMMEDIATE FUTURE
This article looks at the availability of electric energy during the final quarter of the 20th Century. The similarities between the railroad and utility industries are indicated. Assuming electrification of the 20,000 route miles of U.S. railways which carry about 60% of the nation's traffic, it is estimated that the railway energy requirement would be 20 billion kwh at a peak demand of 3,000 MW. Fuels for generating such a requirement are examined. The author concludes that electric utilities face the future with a flexibility of fuel sources; long range programs are destined to provide the electric energy to meet the needs of the U.S. economy, including the transportation sector.

Ross, BA (American Electric Power Service Corporation) *Railway Management Review* Vol. 74 No. 2, 1974, pp A6-A14

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072948
ELECTRIFICATION—A TIME FOR REAPPRAISAL?
This article discusses the relationship between North American railroad and electrification, a flirtation which the author describes as having gone on for 70 years. Canadian Pacific has been studying electrification for five years, having reached no conclusion except perhaps that no general conclusion is possible. It is noted that the best in electrification should be compared with the results possible with a comparable effort devoted to diesel power. It is important in such appraisal that consideration be given to what other forms of motive power might evolve in the 40-year life of a fleet of new electric locomotives. Discussed are the reasons electrification has been far more popular in Europe.

Campbell, K (Canadian Pacific) *Railway Management Review* Vol. 74 No. 2, 1974, pp A1-A5

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

13 072958
ELECTRIFICATION IN SPAIN
Recent electrification schemes of the Spanish National Railways have been at 3000 V dc. The latest plan covers the period 1974-1977. The plan, approved in 1974, supplements the 1972-1975 RENFE program. At the end of 1973 there was a total of 3400 route km electrified. Anticipating

steady growth of freight and passenger traffic, RENFE plans now to convert an additional 3300 km by 1977. Since electric traction is cheaper than diesel, rail traffic in the period 1973-1980 will be less costly for RENFE, which, in turn, represents less cost to the nation.

Modern Railways Vol. 31 No. 314, Nov. 1974, pp 438-440, 2 Fig., 3 Tab., 2 Phot.

PURCHASE FROM: XUM Repr. PC

13 080084
ELECTRIFICATION OF THE ROUTES EHRANG-IGEL AND KARTHAUS-PERL TO THE FRONTIER [Elektrifizierung der Strecken Ehrang-Igel-Bundesgrenze und Karthaus-Perl-Bundesgrenze]
After a review of the traffic geography and the construction works over recent years in the Trier area, the traffic flows are discussed. This is followed by a description of the changes in the signalling equipment consequent upon route electrification as well as the works construction aspects. The Author finally deals with the fixed equipment for electric train running and operation. [German]

Behmann, U *Eisenbahntechnische Rundschau* Vol. 23 No. 9, Sept. 1974, pp 347-353, 9 Fig., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

13 080099
BAY AREA RAPID TRANSIT SYSTEM (BART)
During the activation of the dc-powered commuter train system in the San Francisco Bay Area, stray current has affected many substructures. These problems and their solutions are discussed by operators of transit system facilities, underground electric facilities, gas distribution system, underground telephone cables and petroleum products transmission pipelines.

Bomar, HE (Pacific Telephone and Telegraph Company); Dean, RO Hanck, JA Orton, MD Todd, P (Pacific Gas and Electric Company) *Materials Performance* Vol. 13 No. 12, Dec. 1974, pp 9-17, 23 Fig., 1 Tab.

ACKNOWLEDGMENT: Materials Performance
PURCHASE FROM: ESL Repr. PC, Microfilm

13 080785
COULD ELECTRIFICATION IN U.S. FOLLOW THE EUROPEAN PATTERN?
In conjunction with the Burlington Northern's study of possible electrification of its routes where coal traffic is expected to grow substantially in coming years, Sweden's ASEA made a proposal for electric operation of the line from Sheridan, Wyo., to Lincoln, Neb., using the technology of Europe. The article points out some of the differing ideas between U.S. and Europe on the motive power for such an operation and gives the ASEA recommendations for maximizing line capacity and minimizing investment.

Railway Locomotives and Cars Vol. 148 No. 5, June 1974, pp 10-13, 1 Phot.

PURCHASE FROM: XUM Repr. PC

13 081377
WHEN THE STEAM RAILROADS ELECTRIFIED
This is the complete book of mainline steam railroad electrification in the United States. The book traces the development of electrified railroads from the earliest days. Route maps and technology of each electrification are explained. The book is well researched and well written, with excellent illustrations and photos. The forward is by John W. Barriger III, a foremost advocate of electrification. A chapter is devoted to the future of electrification in the U.S. Street and interurban railways are not covered, but electrified commuter services of mainline railroads are covered.

Middleton, WD
Kalmbach Books 1975, 440 pp, Figs., 790 Phot.

PURCHASE FROM: Kalmbach Books 1027 North Seventh Street, Milwaukee, Wisconsin, 53233 Repr. PC

13 081378
NEW TYPE ELECTRIC EQUIPMENT INSPECTION RAILCAR
Japanese National Railways has developed electrical equipment inspection cars to rationalize the maintenance of electrical installations. This article presents details of the two newly developed inspection cars—one of which checks the catenary and the other the separate signalling installations. The electrically powered, cars can make inspections at speeds to 120 kph. Contact wire abrasion, deviation, height and possible interference with pantograph passage can all be checked. The signalling car can measure automatic train stop ground coil function, the activation of crossing circuits, operation of track circuits, and measure distances.

Fujita, S (Japanese National Railways) *Japanese Railway Engineering* Vol. 15 No. 1, 1974, pp 23-24, 2 Fig., 1 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

13 081387
MOTIVE POWER POLICY ADJUSTS TO RISING OIL PRICES
Despite doubling of diesel fuel costs in 1974, SAR still plans to phase out steam by the mid-1980s. Electrification schemes will be brought forward, and as the break-even point with diesel has dropped from 61 to 17 trains per day, electric traction will probably be expanded to cover lines not included in earlier plans.

Loubser, JH (South African Railways) *Developing Railways* 1975, 3 pp

ACKNOWLEDGMENT: Developing Railways
PURCHASE FROM: XUM Repr. PC

15 057344
TRANSPORTATION AND EQUITY: TOWARDS A FRAMEWORK FOR DISTRIBUTIVE ANALYSIS
The report addresses the need to be beyond the consideration of social, economic and environmental impacts of transportation planning in the aggregate, and take into account the detailed distribution of positive and negative effects of transportation planning decisions on various subgroups with specific needs and disadvantages. Distributive analysis can help to open up the politics of transportation planning by making complex information more accessible, raising hidden issues and sparking debate. If accompanied by explicit attention to distributive effects at new points in the planning process, an expanded range of possible interventions to consider strategies outside transportation itself, and bringing new participants into the planning and decision making process, along with a new set of roles and expectations, distributive analysis can make possible more equitable policy outcomes.

Conference on Transportation Horizons: Rebuilding Urban Environments held at Berkeley, Calif. on 20-25 Sep 73.

McKoy, JH Harris, J
Association of Bay Area Governments, (HUD-CPA-CA-1028) ABAG-HUD-1028-2.01-A, Sept. 1973, 56p

ACKNOWLEDGMENT: NTIS (PB-232188/3)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232188/3, DOTL NTIS

15 057644
SOCIAL AND ECONOMIC EFFECTS OF HIGHWAYS
The report summarizes social and economic effects of modern highways and shows some of the problems of determining these effects, as well as the progress of social highway impact studies made in recent years by State highway agencies and the Federal Highway Administration, along with abstracts of 76 studies completed in the last five years and brief descriptions of 41 additional studies now underway.

Federal Highway Administration Final Rpt. May 1974, 185 pp

ACKNOWLEDGMENT: NTIS (PB-232528/0)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232528/0, DOTL NTIS

15 071748
EFFECTS OF THE RE-LOCATION OF RAILWAY INSTALLATIONS ON OCCUPATIONAL AND RESIDENTIAL PATTERNS IN ADJACENT AREAS: FORT ROUGE CASE STUDY
Relocation of major railway installation from an urban area (in this case, the Fort Rouge section of Winnipeg, Man.) can affect the real estate market, land use and socio-demographic patterns. This study dealt with the effect on a neighborhood traditionally a settlement of railway workers. The hypothesis was that an out-migration of an important segment of the stable population would cause residential deterioration. In the short term, there was insufficient evidence to validate the hypothesis fully. A similar study carried out over a longer period in a smaller community or an area with less functional diversity would possibly yield more positive results.

This article is from the proceedings of the Seminar Series on Transportation 1973-1974 sponsored by the Center for Transportation Studies, University of Manitoba, Winnipeg, Canada.

Rotoff, BM
Manitoba University Vol. 7 pp 1-24, Tabs.

PURCHASE FROM: Manitoba University Center for Transportation Studies, Winnipeg, Manitoba, Canada Repr. PC

15 071765
LIFE-STYLE FACTORS BEHIND MODAL CHOICE
Conventional modal-split models used by transportation planners and engineers have been based on socioeconomic indices and relative travel time and cost characteristics for the alternative modes of travel. Further refinement of these models to include the particular needs of autoless groups such as the poor and elderly include sociocultural factors. This paper describes how life style can affect modal choice and uses the behavior of young inner-city residents to focus attention to the potential contribution of this factor. A dimension for ordering life styles has been found useful in community studies. This dimension orders life styles between extremes of mainstreamer and activity seeker. It is hypothesized that the former life style would be more compatible with using public transit than the latter.

Notess, C *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE3, 9953, Aug. 1973, pp 513-520

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

15 071770
SOCIAL IMPLICATIONS OF LAND USE AND MODE CHOICE
Three sets of analysis are described which suggest that the choice of public transportation is related to higher land use density. The first analysis is based on the New York Region's journey-to-work data of the 1960 census, concluding that higher employment and residential density will increase the proportion of transit users and that the proximity of jobs and housing to one another has important advantages for the low income worker because of shorter trip length. The second analysis, a theoretical examination of a hypothetical suburban area based on models developed in the first analysis, suggests that the clustering of housing around a large job concentration has benefits with regard to limiting highway construction. The third analysis suggests the residential densities at which public transportation can work. The trend today is away from the high densities that can support public transportation. The dilemma can be solved if higher densities of development are built.

Zupan, JM *ASCE Journal of Transportation Engineering* Vol. 99 No. TE2, May 1973, pp 383-391

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

15 071980
SIMULATION OF THE RELATIONSHIP BETWEEN CERTAIN SOCIAL FACTORS AND TRANSPORTATION IN A LOW INCOME AREA
The intent of this paper is to model a typical urban ghetto in terms of three variables: education, health and income, and to simulate the behavior of these variables over a ten-year period. A fourth variable, the effect of accessibility generated by an improved transit system, is then introduced in order to determine the effect of this component upon system performance. From this analysis it is hoped that a number of insights will emerge concerning the development of urban ghettos and the effect (or lack of effect) of transportation in helping this development.

Phelps, BG Dickey, JW *ITCC Review* Vol. 3 No. 2, Apr. 1974, pp 90-95, 5 Ref

ACKNOWLEDGMENT: EI (EIX740902882)
PURCHASE FROM: ESL Repr PC, Microfilm

15 072456
SPATIAL EQUILIBRIUM AND JOURNEY TO WORK
The length of the journey to work may depend on choice of residence from a fixed job site or on choice of job from a fixed residence. The authors consider the factors that influence both in southeast England, and the effects on males and females separately. The authors suggest that rising car ownership increases the variance of journey-to-work lengths, and that the changing demands for skills may also be influential.

Beesley, ME (London Graduate Business School); Dalvi, MQ (Leeds University, England) *Journal of Transport Economics and Policy* Vol. 8 No. 3, Sept. 1974, pp 197-222

PURCHASE FROM: London School of Economics and Political Science Houghton Street, Aldwych, London WC2A 2AE, England Repr. PC

15 072547
GENERALISED TIME AND THE PROBLEM OF EQUITY IN TRANSPORTATION STUDIES
Data on all trips from two studies are analysed to show that, as household income increases, the money spent per mile travelled increases, but the time spent per mile decreases. The use of generalized time gives a different picture of the relationship between income and the total time and money spent on travel to that given by the use of generalized cost. The choice between using generalized time and generalized cost in evaluation is fundamentally a choice between assuming that the marginal utility of time and that of money is constant. The procedures at present recommended

by the Department of the Environment in U.K. have elements of both assumptions, with some loss of consistency. There are some a priori reasons for expecting constant marginal utility of time to be a more plausible assumption than constant marginal utility of money. Time is, by its nature, equitably and unalterably distributed, not subject to the accidents of inheritance, theft, chance, inflation, social system or government decree. Everybody starts of with 24 hours a day. Although the amount of "free" time varies, of course, it probably varies within a much smaller range than the amount of wealth, certainly for the employed population. In allocating time between various activities, the use of words like spend, save, waste, lose, gain, and so on is a reflection of how deeply rooted in language and thought is the concept of time as a fundamental currency. This approach is strengthened by recent developments in two areas where generalized cost has been found to be a useful tool of analysis: (a) in explaining and predicting the behavior of travellers, and (b) in evaluating the social costs and benefits arising from transport projects. Only non-working time will be considered here. It is suggested that in some circumstances generalized time would allow behaviourally correct relationships between non-working time and money to be used in evaluation.

Goodwin, PB (University College, London) *Transportation* Vol. 3 No. 1, Apr. 1974, pp 1-21, 5 Fig., 4 Tab., 19 Ref.

ACKNOWLEDGMENT: Transportation
PURCHASE FROM: Elsevier Scientific Publishing Company P.O. Box 211, Amsterdam, Netherlands Repr. PC

15 080423

BART IMPACT PROGRAM: THE SOCIAL CONSEQUENCES OF BART'S ENVIRONMENTAL IMPACT. SOME PRELIMINARY CONSIDERATIONS AND HYPOTHESES

The paper draws attention to some of the social consequences of environmental perturbations caused by the construction of the Bay Area Rapid Transit System (BART). A series of hypotheses is developed to illustrate the interaction of environmental perturbations and the development of attitudes and behavior that enhance the self-perceived status of individuals. Further research on environmental impacts taking the identified social factors into account is recommended.

Nasatir, D
Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development, (WP-7-1-75) MTC-WP-7-1-75, Oct. 1974, 17p

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS (PB-237356/1SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-237356/1SL, DOTL NTIS

16 057333
ENERGY CRISES IN PERSPECTIVE
The author is manager of energy-systems planning for the G.E. Co.'s Power Generation Business Group in New York City. The book is intended for a wide range of professionals and students interested in world energy activities. It attempts to develop a conceptual framework for thought and action in which today's energy crisis, as others before and yet to come, can be appreciated in perspective. There are 14 short chapters covering such subjects as energy sources, projected consumption, economics of scale and new technology, environmental factors, availability of fuels, electric generation technologies, and comparison of fossil-fuel, nuclear, and solar electricity.

Fisher, JD
Wiley (John) and Sons, Incorporated 1974, 196 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Wiley (John) and Sons, Incorporated 605 Third Avenue, New York, New York, 10016 Orig. PC

16 057490
SUN POWER FOR THE RAILROADS
A system has been developed that will enable solar energy to be used for low power railway applications, such as recharging signal batteries. The solar energy is collected during daylight hours and is able to maintain the battery charge in equipment that requires an independent power source.

Progressive Railroading Vol. 17 No. 3, Mar. 1974, pp 49

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

16 057503
ELECTRIC POWER'S ROLE IN THE U.S. ENERGY CRISIS
A rapid increase in electrification is consistent with a necessary transition away from excessive dependence on oil and gas.

Nagel, TJ (American Electric Power Service Corporation) *IEEE Spectrum* Vol. 11 No. 7, July 1974, pp 69-72, 9 Ref.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfilm

16 057536
TRANSPORTATION ENERGY CONSERVATION: OPPORTUNITIES AND POLICY ISSUES
During the past two decades, energy use in the United States has doubled. Energy is used in all sectors of the economy for a variety of purposes. One-fourth of the energy is used for passenger and freight transportation. There are basically two complementary ways to resolve our mounting energy problems, (1) develop and use improved technologies that provide abundant and clean energy (that is, increase the supply of energy), and (2) improve the efficiency with which energy is used (that is, slow the demand for energy).

Hirst, E (Oak Ridge National Laboratory) *Transportation Journal* Vol. 13 No. 3, Mar. 1974, pp 42-53, 5 Fig., 4 Tab., Refs.

ACKNOWLEDGMENT: Transportation Journal
PURCHASE FROM: XUM Repr. PC

16 057672
FROM MINE TO MARKET BY RAIL...THE INDISPENSABLE TRANSPORT MODE
In 1973, 371 million tons of bituminous coal, nearly 63% of US production, was loaded on rail cars at the mine. Thus if it were not for the railroads nearly two-thirds of our coal would not be mined at all. In large measure, the coal industry simply would not exist. It is no exaggeration to call the railroads the logistical arm of the coal industry.

Coal Age Vol. 79 No. 7, July 1974, p 102

ACKNOWLEDGMENT: Coal Age
PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

16 057739
WASTE LUBRICATING OIL RESEARCH. SOME INNOVATIVE APPROACHES TO RECLAIMING USED CRANKCASE
The Bureau of Mines developed and laboratory tested several innovative techniques for reclaiming used lubricating oil. These processes included percolation through both chemically treated clay and ion-exchange resins, distillation through batch and continuous wiped-wall vacuum apparatus, treatment with solvent extraction systems, and chemical removal of impurities with chelating agents. In each treatment, the criteria of evaluation were oil recovery and reduction of acidic and metallic components. Both vacuum distillation and solvent treatment ranked high in their abilities to remove acidic and metallic components of the used oil with good oil recoveries. A combination of the two techniques gave the best overall results in terms of quality evaluations made by established bench tests. The methods were not ranked according to economic practicability.

Because of the limited edition, only one copy of this publication can be sent to the person applying. Please enclose a self-addressed label.

Whisman, ML Goetzinger, JW Cotton, FO
Bureau of Mines 1974, 20 pp

ACKNOWLEDGMENT: Bureau of Mines
PURCHASE FROM: Bureau of Mines Publications Distribution Branch 4800 Forbes Avenue, Pittsburgh, Pennsylvania, 15213 Repr. PC
RI 7025, DOTL RP

16 071619
RECENT EXPERIENCES WITH SULFUR IN DISTILLATE TYPE FUELS BURNED IN U.S. NAVY DIESEL ENGINES
The diesel engine has a long history of success in the U.S. Navy operating on relatively low sulfur content diesel fuels. However, in recent years the Navy has undertaken a program designed to utilize a more economical multipurpose distillate-type fuel in all shipboard steam boilers, diesel engines, and gas turbines. The multipurpose fuel selected, in addition to other variances, had a somewhat higher sulfur content than normally contained in the standard diesel fuel marine (DFM) being burned in diesel engines and gas turbines. As a result, investigations were conducted to establish both the short and long range effects on diesel engine performance, reliability, and maintenance. This investigation included the operation of a number of engines in the Navy's diesel engine test facility at the Naval Ship Engineering Center, Philadelphia Division. Described is the Navy's most recent investigative efforts relative to the effects of sulfur in distillate fuels for Navy marine diesels, together with some discussion on the use of a single multipurpose fuel for Navy service.

This paper was contributed by the Diesel and Gas Engine Power Division of the ASME and presented at the Diesel and Gas Engine Power Conference and Exhibit, Houston, Texas, 28 April-2 May 1974.

Perry, CF Anderson, W (Naval Ship Engineering Center)
American Society of Mechanical Engineers 74-DGP-4, Jan. 1974, 9 pp, 7 Tab.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ESL Repr. PC, Microfilm

16 071834
OPENING THE TRANSPORTATION BOTTLENECK
Transportation, aided by easy geography and fabulous resources, has helped make the U.S. the most affluent and powerful nation on earth. Until recently, personal income and wealth have increased faster than the cost of transportation, particularly the cost of operating an automobile. But the American mobility dream is becoming clouded. While DOT warns that transportation capacity must be doubled over the next two decades, much of the increase may have to come through more efficient use of what we have. This should stimulate diversion of a bigger share of total transportation spending toward public transit, as the expense of roads. Where public investment is concerned, evaluation will become more exacting with cost-benefit analysis of possible alternatives.

Soast, EA *Engineering News-Record* Vol. 192 No. 18, Apr. 1974, PP 219-231

PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

16 072482
THE ENERGY SITUATION-A RAIL VIEWPOINT
Despite the optimism about rail outlook because of inherent fuel economy, the author views fuel shortages and rising costs as harbingers of potential railroad problems. He cites the indications that many rail lines are operating at near their present capacity where for instance, providing more cars will not overcome the deficiencies in the fixed plant. Energy shortages do not automatically provide capital. While long-term price implications may be optimistic, the short term effects are not all positive for railroads. Costly fuel in restricted supply, it is observed, could bring the transportation-consuming public and Congress to see the morass into which transportation has been forced.

Banner, PH (Southern Railway System) *Transportation Journal* Vol. 13 No. 3, Mar. 1974, pp 15-19

PURCHASE FROM: XUM Repr. PC

16 072572
THE ROLE OF THE U.S. RAILROADS IN MEETING THE NATION'S ENERGY REQUIREMENTS
The proceedings resulted from The Federal Railroad Administration's recognition of the need to explore and highlight the special capabilities of the railroads in a time of petroleum shortage. FRA contracted with the Wisconsin Department of Transportation for sponsorship of a conference to study the role of the U.S. railroads in meeting the nation's energy requirements. The papers presented in this volume explore the market role of the railroads given present and foreçast changes in energy parameters. The posture and reponsibility of government are investigated. Environmental issues, technology and the potential for electrification of main lines are all addressed.

Proceedings of the conference held at the University of Wisconsin, May 6-8, 1974, sponsored by the Federal Railroad Administration and the Wisconsin Department of Transportation contained in "The Role of U.S. Railroads in Meeting the Nation's Energy Requirements."

Wisconsin University, Madison Proceeding Oct. 1974, 84 pp, 32 Ref.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Wisconsin University, Madison Graduate School of Business, Madison, Wisconsin, Repr. PC

16 072577
ENERGY DECLINE, RAILROAD REVIVAL?
Despite the legislation and bureaucratic structure that controls the railroads and the inability or unwillingness of management to use pricing as a primary means of adjustment to changing technology, railroads have retained many inherent advantages as a transport mode. In elements such as time, convenience, public esteem and political power they have moved down in the hierarchy of values common to the U.S. public. The potential of railroads in reducing both energy costs and pollution can be realized only through efforts capable of overcoming all the interests that have gained by keeping railroads from becoming more competitive. The author concludes that whatever is done to shift freight and passenger traffic to railroads will become piecemeal.

Proceedings of the conference held at the University of Wisconsin, May 6-8, 1974, sponsored by the Federal Railroad Administration and the Wisconsin Department of Transportation contained in "The Role of U.S. Railroads in Meeting the Nation's Energy Requirements."

Cottrell, F (Scripps Foundation)
Wisconsin University, Madison Proc Paper Oct. 1974, pp 10-15, 6 Ref.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Wisconsin University, Madison Graduate School of Business, Madison, Wisconsin, Repr. PC

16 072579
ENERGY: FROM SURPLUS TO SCARCITY?
These papers were presented at the Institute of Petroleum Summer Meeting, June 1973. The papers discussed energy from a variety of sources: coal, future petroleum supplies, natural gas, nuclear energy, oil sands, shales, and synthetics. Other papers discussed an all-electric economy, the Middle East's exporting countries, oil in the U.S. energy crisis, and the outlook for Europe.

Halsted Press 1974, 242 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Halsted Press 605 Third Avenue, New York, New York, 10016 Orig. PC

16 072581
U.S. ENERGY OUTLOOK: NEW ENERGY FORMS
The purpose of the report is to discuss the contribution that can be made to the nation's energy requirements by (1) energy resources that are projected to provide relatively little usable energy during the 1971-1985 period as compared with the major resources—oil and gas, coal, nuclear energy, oil shale, and tar sands, (2) processes that can increase the efficiency of fossil-fuel energy utilization for the generation of electric power, and (3) alternative or unconventional energy forms. The task group investigated hydropower—a primary energy resource, the full potential of which is largely developed—and geothermal energy, which is generally undeveloped at present but will make a larger though relatively insignificant contribution by 1985. Utilization of other primary energy resources investigated—agriculture, solar, tidal, and municipal trash—are still in the research and development stage.

National Petroleum Council Paper 1973, 193 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: National Petroleum Council 1625 K Street, NW, Washington, D.C., 20006 Repr. PC

16 072677
AVAILABLE ENERGY CONVERSION AND UTILIZATION IN THE UNITED STATES
In this period of concern for our energy resources and the environment, it is imperative to consider the manner in which our energy resources are consumed, and focus our attention on those processes in our society that are significant in magnitude and using the resources least efficiently. This paper considers both of these topics: the performance of a large number of energy conversion and utilization systems is investigated and the energy flows in the U.S. are illustrated from an available energy viewpoint. Our society typically uses a high-quality energy (fossil fuels, nuclear energy, hydropower, ECT.) and converts it to a high or low-quality (low-temperature heat transfer) energy depending on the particular need. Obviously, when high-grade energy is converted to low-grade energy with no product other than the low-grade energy, something is lost. The usual energy efficiencies, which arise from the first law of thermodynamics, cannot reflect this loss since energy is always conserved. The efficiency termed effectiveness, which arises from the available energy concepts (the second law of thermodynamics), does reflect the loss associated with a change of grade of an energy quantity. Since the available energy concept is not normally associated with energy flow studies, it will now be more completely outlined before considering system performance and energy flows in the U.S.

This paper was contributed by the Power Division of ASME for presenteation at the Winter Annual Meeting, 17-21 November 1974, New York, New York.

Reistad, GM (Oregon State University)
American Society of Mechanical Engineers No. 74-WA/Pwr-1, July 1974, 9 pp, 3 Fig., 9 Tab., 27 Ref.

ACKNOWLEDGMENT: ASME
PURCHASE FROM: ASME Repr. PC

16 072951
ENERGY AND TIME SAVINGS ASSOCIATED WITH RAPID GROUND TRANSPORTATION SYSTEMS
Guided ground transportation at high speeds can play an important economic and social role in the energy shortage. Such transport permits a more flexible use of various sources of available energy when a particular one happens to be in short supply. This should also increase the demand for electric propulsion since electricity is less sensitive to cost increase based on international oil supply. Research and development in high-speed guided ground transportation systems are needed to broaden the available energy base.

Tassin, YM *Railway Management Review* Vol. 74 No. 2, 1974, pp 1-8, 5 Tab.

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

16 080250
GUIDELINES TO REDUCE ENERGY CONSUMPTION THROUGH TRANSPORTATION ACTIONS
This document is intended to serve as an aid to local transportation planners, traffic engineers, and administrators in the incorporation of energy conservation considerations into the transportation planning process, especially in reference to short-range transportation planning. Various types of low cost, short-term transportation actions are summarized and their potential, for reducing energy consumption is estimated. Summary tables are presented which array the actions in terms of relevant institutional and legal considerations, and socioeconomic and environmental effects. Interrelationships between the energy consumption reduction potential of groups of actions are discussed and a process for formulation of coherent packages of such actions is presented. Guidelines are presented for evaluating and formulating these action packages for large (1,000,000 and over population), medium (250,000 to 1,000,000), and small (50,000 to 250,000) urban areas.

Voorhees (Alan M) and Associates, Incorporated, Urban Mass Transportation Administration, (UMTA-IT-06-0092) May 1974, 128 pp

ACKNOWLEDGMENT: NTIS (PB-235983/4ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235983/4ST, DOTL NTIS

16 080303
U.S. ENERGY: A 40 WATT OUTLOOK
By the end of this century some of the energy resources the United States has taken for granted may run out at the same time that the energy demand has been growing at a steady rate. Except for nuclear energy, R&D programs for new sources or for improved technology and efficiency have been random with the lackadaisical approach reinforced by what has been plentiful and cheap fuel. Suddenly the energy picture has had a worldwide brownout. The U.S. economy and environment appear to be threatened unless something is done fast.

Fairweather, V *ASCE Civil Engineering* Vol. 44 No. 12, Dec. 1974, pp 45-49

PURCHASE FROM: ESL Repr. PC, Microfilm

16 080344
EFFECT OF DIESEL FUEL PROPERTIES ON EMISSIONS AND PERFORMANCE
Tests were conducted with several production diesel engines and one prototype low-emission diesel engine to determine the effect of fuel properties on exhaust emissions and engine performance. Fuel cetane number was found to be the most significant fuel property; low cetane fuels resulted in higher hydrocarbons and oxides of nitrogen and increased noise. Conversely, higher cetane fuels produced lower emissions and noise, and also improved engine starting characteristics. The degree of these effects was influenced by engine configuration.
Presented at SAE meeting, September 9-12, 1974.

Broering, LC (Cummins Engine Company); Holtman, LW
Society of Automotive Engineers Preprint #740692, Sept. 1974, 12 pp, 12 Ref.

ACKNOWLEDGMENT: EI (EI 74 076381)
PURCHASE FROM: ESL Repr. PC, Microfilm

16 080363
WASTE LUBRICATING OIL RESEARCH. A COMPARISON OF BENCH-TEST PROPERTIES OF RE-REFINED AND VIRGIN LUBRICATING OILS
Three samples of waste lubricating oil were re-refined by processes developed by the Bureau of Mines and reformulated with additives to meet designated requiremnts for viscosity and service. Quality-defining bench-scale tests were used to compare and evaluate the quality of these three motor oils, eight commercially re-refined lubricating oils, and three new lubricating oils. Most of the re-refined oils studies could not be distinguished from new oils by the bench tests used to define quality. There was some evidence, however, that one and perhaps more of the re-refined products investigated might not meet all of the quality standards of new lubricating oil, suggesting the need for better quality controls by re-refiners.
Report on Investigations 1973.

Whisman, ML Goetzinger, JW Cotton, FO (Bartlesville Energy Research Center)
Bureau of Mines #7973, 1974, 18 pp, 9 Tab., 4 Ref.

ACKNOWLEDGMENT: Bureau of Mines
PURCHASE FROM: Bureau of Mines C Street Between 18th and 19th, NW, Washington, D.C., Repr. PC

16 080792
COAL'S INCREASING ROLE IN THE FOSSIL FUEL INDUSTRY
Coal was used by man thousands of years ago and has played a significant role in modern civilization. The solid fuel will surely continue to be important in the affairs of man. The United States has about 20 percent of the world's coal resources, enough to last several centuries even at an expanded rate of consumption. Projected expansion of coal consumption for energy and fuels production will require the solution of several major problems, including those related to mining methods, mine health and safety, economics, and coal process technology.
This paper was prepared for the 49th Annual Fall Meeting of the Society of Petroleum Engineers of AIME, Houston, Texas, 6-9 October 1974.

Eckard, WE (Bureau of Mines)
Society of Petroleum Engineers Preprint SPE 5093, 1974, 6 pp, 1 Fig., 1 Tab.

ACKNOWLEDGMENT: Society of Petroleum Engineers
PURCHASE FROM: Society of Petroleum Engineers 6200 North Central Expressway, Dallas, Texas, 75206 Repr. PC

16 080941
TRANSPORTATION AND ENERGY
The amount of energy used for transportation, the way energy used for this purpose is growing, and the reasons for the increased use of energy for transportation purposes are discussed.
Presented at Annual Illinois Energy Conference (1st) Chicago, Ill., 13-15 Jun 73.

Mooz, WE
Rand Corporation, National Science Foundation P-5025, June 1973, 24 pp

Grant NSF-GI-44

ACKNOWLEDGMENT: NTIS (AD/A-001991/9SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-001991/9SL, DOTL NTIS

16 080942
ENERGY TRENDS AND THEIR FUTURE EFFECTS UPON TRANSPORTATION
Demand, supply, and price of energy for transportation purposes are examined and projections, based upon trends in these areas, are given concerning their future effects upon transportation.

Mooz, WE
Rand Corporation P-5046, July 1973, 27 pp

ACKNOWLEDGMENT: NTIS (AD/A-002005/7SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-002005/7SL, DOTL NTIS

16 080970
THE ENERGY BALLOON
This book reviews the history of energy in the U.S., and what it calls the American Pageant of Waste. It considers potential energy alternatives and also looks at new attitudes and leaner lifestyles. The book devotes particular attention to transportation and views favorably the energy efficiency of railroad transportation and urban rail transit.

Udall, SL Conconi, C Osterhout, D
McGraw-Hill Book Company 1974, 288 pp

PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

16 081863
INDUSTRIAL ENERGY STUDIES OF GROUND FREIGHT TRANSPORTATION. VOLUME I
Detailed energy use data for truck and railroad freight transportation in selected SIC categories is developed. Report covers industry characteristics of energy use, sources of supply, and conservation and substitution measures, for railroad, line haul; railroads, switching and terminal establishments; REA express; local trucking, with and without storage, and terminal and joint terminal maintenance facilities for motor freight transportation; and trucking (except local).
See also Volume 2, PB-236 017.

Leilich, RH Prokopy, JC Ruina, D
Peat, Marwick, Mitchell and Company, Federal Energy Administration
Final Rpt. July 1974, 237p

Contract DI-14-01-001-1670

ACKNOWLEDGMENT: NTIS (PB-236016/2SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236016/SL, DOTL NTIS

16 081864
INDUSTRIAL ENERGY STUDIES OF GROUND FREIGHT TRANSPORTATION. VOLUME II, APPENDICES
No Abstract.
See also Volume 1, PB-236 016, RRIS 081863.

Leilich, RH Prokopy, JC Ruina, D
Peat, Marwick, Mitchell and Company, Federal Energy Administration
Final Rpt., 55p

Contract DI-14-01-001-1670

ACKNOWLEDGMENT: NTIS (PB-236017/0SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236017/OSL, DOTL NTIS

16 081865
METHODS FOR ESTIMATING THE VOLUME AND ENERGY DEMAND OF FREIGHT TRANSPORT
Freight volume (measured in ton-miles) carried by various transportation modes is analyzed and relationships are developed for estimating demands for each type of freight service, with emphasis on freight transport by railroad. The relations are combined with predictions of energy-intensiveness to present illustrative estimates of future energy demand for freight transportation. Estimating techniques explored include ordinary least-squares regressions, stepwise regressions, and factor analysis.

Tihansky, DP
Rand Corporation, National Science Foundation R-988-NSF, Dec. 1972, 74p

Grant NSF-GI-44

ACKNOWLEDGMENT: NTIS (PB-236207/7SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236207/7SL, DOTL NTIS

17 052511
ORE COLLOQUIA. REPORT ON THE THIRD COLLOQUIUM "TECHNICAL COMPUTER PROGRAMS" AMSTERDAM, 8TH TO 10TH MAY 1973.
This report contains the summaries of fifteen individual contributions on catenary and pantograph systems, track design, train performance, car design, suspension systems, locomotive design and utilization, braking systems, yard simulation, and road operations.

International Union of Railways AZ40/RP5/E, June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052516
ELECTRONIC TEST INSTALLATION (VIENNA-ARSENAL). TESTS MADE IN THE ELECTRONIC TEST INSTALLATION FROM 1ST SEPTEMBER 1970 TO 31ST AUGUST 1971
This is the fourth annual report of the installation for testing data transmission equipment, erected and operated in Vienna jointly by the Office for Research and Experiments (ORE) of the International Union of Railways (UIC) and the Austrian Federal Research and Test Institute. In the course of the financial year, one modem for a modulation rate of 600/1,200 bauds, and, one modem for a modulation rate of 4,800 bauds were tested. As a result of this, the number of modem types entered in the comparative table and in the comparative curves has risen to 14. In addition to the test reports on modems for data transmission, this report contains the accounts of the investigation conducted under various climatic conditions to test electric line connectors of the automatic coupler and the automatic vehicle identification system.

International Union of Railways AZ32/RP 4/E, Apr. 1973, Figs., Phots.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052517
ELECTRONIC TEST INSTALLATION (VIENNA-ARSENAL). TESTS MADE IN THE INSTALLATION FOR TESTING DATA TRANSMISSION EQUIPMENT FROM 1ST SEPTEMBER 1969 TO 31ST AUGUST 1970
The present report is the 3rd annual report concerning the installation for testing data transmission equipment erected in Vienna and operated jointly by the Office for Research and Experiments (ORE) of the International Union of Railways (UIC) and the Austrian Federal Research and Test Institute. In the course of the financial year, two modems for a modulation rate of 600/1,200 buds, one modem for a modulation of 4,800 bits/sec and one tentative device for data transmission were tested. As a result of this, the number of modem types entered in the comparative table and in the comparative curves has risen to 12.

International Union of Railways AZ32/RP 3/E, Aug. 1972, 35 pp, Figs., Tabs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052569
TECHNICAL CHARACTERISTICS RELATING TO THE COMPONENTS OF DATA TRANSMISSION NETWORKS USED BY THE RAILWAYS
Information on the technical characteristics of the components of data transmission networks making up the teleprocessing systems of the UIC railways is given. It is limited to binary code digital transmission in series and parallel over conventional telegraphic and telephonics type circuits; high speed transmissions by carrier transmission equipment are not covered.

International Union of Railways 24, Jan. 1970, 82 pp, 8 Fig.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052571
HUMP YARD SIMULATION
Simulation of the hump yard sorting process is only possible by means of a random model. The variables of this model are the sequence and direction of the cuts and the resistance to rolling. In connection with the resistance to rolling other technical data typical of the different cuts need also to be given. The computer processes the train to be humped on the basis of the statistical distribution curve. The stored program calculates the running data for all cuts, allowing for progressive occupation of the sorting sidings; it also initiates accurate target braking. The "distance-speed-time" data of the preceding cut are noted and the speed of the following cut is adjusted accordingly. The program also ensures that the previously stored speed limits are observed. Based on the guide numbers of the successive cuts the computer decides which switch in the splitting-up zone will be passed and what time intervals between cuts will be observed for a given safety system. The input of this program includes variables which differ considerably and the program is therefore adapted to various tests. The output indicates for each sorting siding both the length of track occupied by cuts and that still free available, the utilization factor as a percentage, and the level of energy absorbed by braking. The computer used also evaluates the sorting siding group. This program has a variant which enables the desired distance-speed-time data to be written even if the design engineer has stored in the computer the variant with the most adverse sequence of cuts. If any retarder application is required, the computer repeats the whole calculation and calculates new data of the hump dynamics for the braked section.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Lehel, J
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052572
AN ANALOG-DIGITAL METHOD OF DETERMINING VERTICAL TRACK IRREGULARITIES AS THE EXCITATION OF A RAIL VEHICLE'S VERTICAL OSCILLATIONS
Unknown dynamic parameters of the track have been obtained by statistical calculations. The parameters are used to design an analog-system to determinate a "substitute vertical track irregularity" as an excitation of vertical vehicle oscillations for the accepted model of the track. The signal recorded on the magnetic tape may also be used for an analog study of the vertical vibrations of other vehicles. The computations have been based on the correlation function method.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Kosieradski, W
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052573
USE OF COMPUTERS FOR OPTIMAL DESIGN OF THYRISOTR LOCOMOTIVES
The paper describes the calculations which were made to get an optimum design of the electrical equipment for the thyristor locomotive Rc-2. A program which calculates the power factor and the harmonics with high accuracy using a step-by-step method is reported. A combined program for train-running and loadflow calculation was used to determine the losses in the transmission system as well as the load/speed-distribution for the locomotive. The author draws the conclusions that an accurate design of the electrical equipment adapted to the estimated running conditions can result in substantial decrease of the overall cost of a locomotive.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Sundstrom, L
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052574
REDUCTION OF MANUAL CALCULATIONS WHEN INVESTIGATING THE ADVANTAGES OF USING ELECTRIC AND HYDRODYNAMIC BRAKES
Simulation of train movements with the aid of an electronic data processing equipment, taking into consideration operating and economic factors, is used by the German Federal Railway to produce an economically optimum design of electric and hydrodynamic brakes. The resulting great quantity of data is handled by means of three data processing programs: (1) train movement calculation program; (2) brake system calculation program; and (3) program to ascertain the economy of brake systems. The programs are supplemented by manual evaluations.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Kraus, GD
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052575
STUDY OF THE LATERAL STABILITY OF A BOGIE
This study permits a mathematical model to be found representing the movements of free bogie supporting a given load and running on a straight track of good quality. Starting from this model, it is possible to show the influence of the principal structural-design features of a bogie on its critical speed, namely: (1) characteristics of the connections between bogie-frame and axles; (2) bogie wheelbase: (3) sprung mass: and (4) equivalent conicity characterising the geometry of the contact between rail and wheel. This study has permitted the optimization of the choice of constructional characteristics of the bogies of the SNCF TGV 001 trainset.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Joly, R
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052576
A COMPUTER SYSTEM FOR TRAIN PERFORMANCE CALCULATIONS
This paper is concerned with the application of digital computers to train performance calculations. It describes how, starting with the calculation of minimium running times and associated performance variables, BR have extended their computer methods to the construction of data information systems for running times and for route geography, design evaluations, freight train maximum load calculations and energy minimization studies. Significant developments in train performance since 1960 are outlined, and the present system is fully explained. The use of the system by various departments—engineering, planning and research—is described, and emphasis is placed on the satisfactory relationship between programmers and engineers which has been established, and its consequential benefits. Illustrative examples of typical applications are given.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Hargreaves, JE
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052577
AUTO-CORRECTING PROCEDURE FOR THE OPTIMIZATION OF TURNROUND SCHEDULES OF MOTIVE POWER UNITS
Turnround schedules for motive power units are obtained using electronic data processing systems, from a solution of the problem of linear optimisation. While allowing for the prescribed reversal times of locomotives and for other operating requirements, the minimum locomotive standing times are achieved. The auto-correcting procedure makes use of certain reserves in the reversal times, thus enabling locomotive transitions, which are frequently only a few minutes too short, to be incorporated into the turnround, consequently leading to a considerable improvement of the turnround schedule. The reductions in reversal times required for this are already covered by the computer program during the establishment of the turnround schedule and recorded for the next program sequence, using amended data. The process requires several correction stages and it is terminated as soon as the shortest possible reversal time has been attained at a reversal station. The user can thus make a choice from a number of turnround schedules. Experience hitherto has confirmed that this procedure leads to optimum turnround schedules.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Gluck, H
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052578
SIMULATION ON THE COMPUTER OF THE RUNNING OF A VEHICLE WITH TILTING BODY
The running of a vehicle with tilting body is simulated on the IBM 360/40 computer for the purpose of comparing different curve and body rotation detection systems (with or without feed back) relative to the limit conditions of the track. For the simulation, the following data are used: 1. Track: Curve radii-Superelevation—Irregularities measured every 5 metres according to the track condition record. 2. Vehicle: Running speed-Parameters relative to the rotation, such as the detection time and response time of the mechanism controlling the rotation. As result of the simulation, moment by moment, the characteristic trend of the uncompensated acceleration on the coach body is obtained for the whole of a speed-range according to different characteristic parameters of the system.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Frullini, Tacci
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052579
VIBRATION ANALYSIS OF A RAILWAY COACH BODY USING FINITE ELEMENTS
It is now possible to automatically calculate, with satisfactory accuracy the symmetrical and antisymmetrical bending, distortional and rigid body vibration frequencies and mode shapes of a railway coach structure. The method described uses an extension of the three dimensional finite element stress analysis program NEWPAC developed by the British Railways Board Research and Development Division. Results are presented for the BR Mk III standard coach and experimental results are included for comparison.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Dodd
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052580
SIMULATION OF THE LOCOMOTIVE RUNNING DIAGRAM
The basis of the program is a simulation model. The object of our investigation is to establish a program by means of which we are able to produce locomotive running diagrams on the computer within a relatively short time. In the case of inexact groups of trains to be routed, and for waiting times between two trains which exceed a given time interval, the program constructs suitable individual locomotive runs. Critical cases in the locomotive running diagram which require human decisions are indicated by the computer. These decisions modify the inputs of the program. With

these modified inputs, the process for establishing the working diagram must be repeated. The optimum criterion is the minimum time for the realization of the produced diagram. The basis of the model is a graphical structure. The points of this structure signify the arrival of trains for subsequent routing to their destination stations. In this structure, a "hamiltonian way" must be determined which satisfies the optimum criterion and all the conditions which are necessary for achieving the diagram. This process is accomplished by means of a combinative method. The program produces different variants of the diagram satisfying the indicated conditions. From these variants, the optimum solution is determined and the calculation of the indices of the diagram are carried out. Finally, the process outputs are printed.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Csikos, M
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052581
DYNAMIC ANALYSIS OF OVERHEAD CURRENT COLLECTION FOR ELECTRIC TRACTION
In this paper some of the dynamic problems associated with high speed current collection from overhead catenaries are discussed and analyzed using a program developed by BR. This program simulates the dynamic behavior of the current collection system by using a finite difference method to solve the equations of motion for the catenary and pantographs are suggested.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Cardwell, EAC
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052582
OPTIMIZATION OF THE LAYOUT AND OF THE RE-ALIGNMENT OF THE LAYOUT OF CURVED TRACK
This study is devoted to problems in connection with the layout of railway tracks in curves, the "versine method" currently employed on the SNCF being the sole method considered. These problems involved are of two types and concern: (1) the re-alignment of the layout during track maintenance operations: it is a case here of the correction of layout defects due to the passage of trains and not involving important track shifting; (2) detailed modification of the layout: it is a case here of the modification of the layout of a curve carried out in particular with a view to an increase in the running speed, combined, possibly, with a fault-correction. The solution of these two problems is obtained with the help of linear programming: it gives the track-shifts and the future versines and superelevations at each reference point on the site in taking into account one or more optimization criteria. The results are presented in the form of a list accompanied by a diagram supplied by a curve-plotter and giving versines and superelevations as a function of the curvilinear abscissa. The first type of problem has now been solved, both for simple curves and for curves with successive arcs. The calculation program concerning the second type of problem is in the course of being perfected and finalized.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Blanc, P
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052583
COMPUTER—AN AID TO RAILWAY MECHANICAL ENGINEERING IN A DEVELOPING COUNTRY
This paper underlines the role of the computer in the technological development of a country with special reference to the problems faced by the developing nations. After emphasising the need for an integrated technical development the paper highlights the use being made by the Indian Railways in Mechanical Engineering problems to optimise the performance of their assets. Six computer programmes developed for optimising the performance potential of Motive Power Traction Units and for expediting the design development work have been discussed in detail.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Bhalla, P Mital, HP Syngal, SP Gopalakrishnan, H
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052584
CALCULATION PROGRAMS FOR CATENARY SUPPORTS
Calculation on the computer of the mechanical strength and stability of the foundations of four different types of existing overhead contact system support-masts of the Belgian electrified network for a new, higher mechanical stressing due to a modification of the installation in question.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Baekelandt, PJ
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 052585
AUTOMATION OF TRAFFIC INSPECTIONS FROM THE POINT OF VIEW OF OUT-OF-GAUGE TRANSPORTS
The steadily increasing requirements which are experienced in the sector of out-of-gauge transports suggests the advisability of automating the numerous repetitive operations required for carrying out the control-checks of the transportability with respect to fixed obstructions and to trains passing in the opposite direction, in order to substantially reduce the waiting times for respective autorizations while simultaneously improving the effective use made of the staff. The programme carries out the whole of the required calculations in giving the running instructions in each section of line. Input: Data banks for the lines(structure gauges). Route record-files, on magnetic disk; characteristics of the transport and distances run, through the medium of a terminal; Output: Results of the control-checks; System: IBM 360/50.

This paper was presented at the Third ORE Colloquium held in Amsterdam, May 8th to 10th 1973, and its Summary is contained in the Colloquium report #AZ40/RP 5/E; See RRIS #052511.

Pandolfo, A
International Union of Railways June 1973

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

17 057408
SOUTHERN'S APPROACH TO FREIGHT CAR CONTROL
Outline of an operational on-line computer system for control of freight car and train movements is presented. The design concepts place emphasis on utilizing the most straightforward and modular approach possible, specifically aimed at providing only the basic essential information.

Railway System Controls Vol. 5 No. 4, Apr. 1974

ACKNOWLEDGMENT: EI (EIX740605855)
PURCHASE FROM: ESL Repr PC, Microfilm

17 057426
COMPUTERIZED INFORMATION SERVICES OF FRENCH NATIONAL RAILWAYS [L'informatica presso la S.N.C.F.]
Introduction of computerized data processing and data transmission on French National Railways (S.N.C.F.) since 1966 is described. Diagrams of telecommunication networks are given. The article is based on the data given in several issues of the Revue Generale des Chemins de Fer. [Italian]

Tartarini, W *Ingegneria Ferroviari Italiani* Vol. 28 No. 9, Sept. 1973, pp 672-680, 12 Ref.

ACKNOWLEDGMENT: EI (EIX740602767)
PURCHASE FROM: ESL Repr PC, Microfilm

17 057493
ACI IN WORLD'S LARGEST TERMINAL AREA
The automatic car identification system (ACI) is now covering the 1,750 square mile Chicago terminal area. The system uses 109 scanners to check on the operations of the 21 railroads in the terminal area. The article describes the physical layout of the system and how the system operates.

Progressive Railroading Vol. 17 No. 4, Apr. 1974, pp 50-55

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

17 057496
"DATA-MANAGED" MAINTENANCE FOR A $100 MILLION DIESEL FLEET
Illinois Central Gulf has developed a computer program, called Motive Power Accounting and Characteristics System (MACS), that contains all the vital maintenance statistics for the company's 1100 unit diesel fleet. The program has increased a locomotive's availability record, cut down on paperwork and permitted a quality control check on the diesels.

Progressive Railroading Vol. 17 No. 5, May 1974, pp 48-52

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

17 057513
FASTER TRAIN KEEPS TRACK OF RAILROAD FREIGHT CAR INVENTORY
At any given moment, a railroad freight car in the North American continent may be at any point along some 330,000 miles of track, or on the lines of any one of 73 or more railroads. It may be empty or moving under load; it may be awaiting loading or unloading; it may be undergoing classification in a yard; it may be awaiting repair; or it may be standing idle in surplus. To keep closer tabs on its inventory of over 2-million cars, the Association of American Railroads is upgrading its on-line Train system to provide more information, more quickly, and to add capabilities that its predecessor lacked.

Data Communications User June 1974, 2 pp

ACKNOWLEDGMENT: Data Communications User
PURCHASE FROM: Communication Trends Incorporated 181 South Franklin Avenue, Valley Stream, New York, 11581 Repr. PC

17 057520
CYBERNTICS DELEGATES EXCHANGE EXPERIENCE IN WASHINGTON
At the fourth—and possibly the last—cybernetics symposium, the theories and ideas of 1963 that have now been implemented were subject to critical analysis. Although progress has been made at the real-time tactical level, the complexity of models that would permit comparison of different operating strategies still limits use of the computer as a management tool.

Railway Gazette International Vol. 130 No. 6, June 1974, pp 229-231

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: IPC Transport Press Repr. PC

17 057649
TASSIM: A TRANSPORTATION AND AIR SHED SIMULATION MODEL, VOLUME 1. CASE STUDY OF THE BOSTON REGION
The TASSIM model integrates an urban transportation planning model, vehicle emission factors, and simple air diffusion models in a simulation framework that can be used to analyze the air quality effects of transportation policies. The model is spatially disaggregated, and it is compatible with data sources available in many metropolitan areas. This volume briefly describes the structure of the model and then analyzes several model applications that simulate for Boston the air quality effects of transportation control land use, and stationary source policies. The transportation control policies are evaluated in a cost effectiveness framework. The final sections consider possible extensions of the model and outline the model's computational aspects.
See also PB-232934, RRIS 057650.

Ingram, GK Fauth, GR
Harvard University Final Rpt. May 1974, 107 pp

Contract DOT-OS-30099

ACKNOWLEDGMENT: NTIS (PB-232933/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232933/2, DOTL NTIS

17 057650
TASSIM: A TRANSPORTATION AND AIR SHED SIMULATION MODEL. VOLUME II. PROGRAM USER'S GUIDE
The TASSIM model integrates an urban transportation planning model, vehicle emission factors, and simple air diffusion models in a simulation framework that can be used to analyze the air quality effects of transportation policies. The model is spatially disaggregated, and it is compatible with data sources available in many metropolitan areas. Designed to aid others in using TASSIM, this volume describes the computer programming steps in the model, the input data required by various subprograms, and the procedures used to calibrate the model to a metropolitan area. The volume also includes an outline of the programming changes needed to simulate various policies, and a listing of the model's FORTRAN code.
See also PB-232933, RRIS 057649.

Ingram, GK Fauth, GR Kroch, EA
Harvard University Final Rpt. May 1974, 201 pp

Contract DOT-OS-30099

ACKNOWLEDGMENT: NTIS (PB-232934/0)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232934/0, DOTL NTIS

17 057715
CRTIS: FOR NINE CENTS TOMORROW IS HERE
In April 1974 the Chicago Railroad Terminal Information System (CURTIS) became operational. This is the first area wide car control system and controls an area the size of Rhode Island using 109 scanners at 40 sites. CRTIS provides four basic reports for member railways: validated interchange documents, system car location reports, empty cars received analysis, and a train activity report for selected railroads of a 24 hour traffic density summary.

Shaffer, FE *Modern Railroads* Vol. 29 No. 7, July 1974, pp 46-49

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

17 057719
COLOR GRAPHICAL DISPLAY SYSTEM
As one method of simplifying the presentation of complex data for computer-controlled systems such as railroads, a graphical printer using conventional color CRT display techniques is described. This display technique can serve as dynamic support for processes, along with picture-processing software and optional instruments such as the light pen and keyboard.

Yamazaki, E (Kamakura Works); Ohkawa, K (Kamakura works) *SID Journal* Vol. 11 No. 3, May 1974, pp 14-21

PURCHASE FROM: Blackwent Publishing Company 1605 Cahuenga Boulevard, Los Angeles, California, 90028 Repr. PC

17 057738
INTRODUCTION TO THE APPLICATION OF THE DYNALIST COMPUTER PROGRAM TO THE ANALYSIS OF RAIL SYSTEMS DYNAMICS
DYNALIST, a computer program that extracts complex eigenvalues and eigenvectors for dynamic systems described in terms of matrix equations of motion, has been acquired and made operational at TSC. In this report, simple dynamic systems are used to define the DYNALIST terminology. Input parameters required to model a rail vehicle are described. Prepara-

tion of a card deck to run the program is detailed. The program output is examined in terms of an application to a hunting analysis of a rail vehicle.

Perlman, AB Lanza, JJ
Department of Transportation, (DOT-TSC-FRA-74-2) Intrm Rpt FRA-ORD&D-75-2, Aug. 1974, 46 pp, 5 Fig., 9 Tab., 4 Ref.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235 361/AS, DOTL NTIS

17 071629
THE ENGINEERING SOCIETIES LIBRARY
A report on the Engineering Societies Library describing its services and administration. ESL will research any engineering or technological subject. Members of Founder and Associate Societies get a discount if the search is made for their personal use. It is the only engineering library in the world with a published index to its report and periodical collection—Engineering Index. The library was established in 1913. The library is now concentrating on acquisiton of volumes in the field of environmental engineering.

Bays, G (American Society of Civil Engineers) *ASCE Civil Engineering* Vol. 44 No. 8, Aug. 1974, pp 88-89

ACKNOWLEDGMENT: ASCE
PURCHASE FROM: ESL Repr. PC, Microfilm

17 071798
SPEECH OUTPUT SYSTEM FOR MAN/PROCESS COMPUTER DIALOG IN RAILWAY OPERATION [Sprachausgabe fuer den Dialog Mensch-Prozessrechner im Eisenbahnbetrieb]
The German Federal Railway (DB) will use process control computers with a large periphery to an increasing extent for operational management. In many cases it is necessary to hold a dialog between the operating staff in passenger stations and marshalling yards and the process computer in the Operation Control Centre. To achieve this, the staff can transmit requests in digital form with a keyboard or a dial to the process computer. For information from the process computer to the staff and passengers, Siemens has developed a speech output system. Principle, function, and method of operation are dealt with by the authors. [German]

Kunze, JG Wunderlich, W *Siemens Review* Vol. 48 No. 5, May 1974, pp 344-351, 31 Ref

ACKNOWLEDGMENT: EI (EI 74 805595)
PURCHASE FROM: ESL Repr PC, Microfilm

17 071940
A COMPUTER PROGRAM FOR ESTIMATING COSTS OF TUNNELING (COSTUN)
A computer performs all logic and computations customarily done by hand in preparation of engineer's estimates or contractor's bid on tunnel-shaft systems. The program described is based on construction methods, work forces and equipment selections corresponding to the current state-of-the-art of tunnelling. The program contains logic to permit the estimate of costs of complicated tunnel-shaft systems. In any estimate, the program will accommodate a large number of values or changes in the values of the factors that affect costs, such as tunnel shape and size, shaft depth, ground characteristics, and construction method. To provide great flexibility, the user of the program is provided with the option of selecting lining type and thickness, profit and overhead margins, and other input data. Suggestions for selecting an appropriate value for these inputs are contained in the report. Portions of this document are not fully legible.

Wheby, FT Cikanek, EM
Harza Engineering Company Final Rpt. FRA-ORD/D-74-16, Oct. 1973, 566 pp

Contract DOT-FR-20007

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-228740/7, DOTL NTIS

17 071963
AUTOMATED, INTEGRATED DATA PROCESSING AS A PART OF A COMPREHENSIVE STAFF INFORMATION SYSTEM OF THE GERMAN FEDERAL RAILWAY
Twelve years after the commissioning of the first large computer installation of the German Federal Railway, numerous individual processes are now being tackled by fourteen electronic data processing plants. However, in view of the novel conditions for the solution of problems offered by electronic data processing techniques, the development of an automated, integrated information system of the German Federal Railway can now be discerned. For all functional spheres and all levels of the undertaking, it is intended to provide-at the right place, at the right time, in the necessary quality and quantity and at reasonable cost-all the information required for planning, realisation, monitoring and control, as well as the necessary routine support. For this purpose, it is necessary, in close co-operation with the individual departments, to analyse the relevant basic information over the entire range of the undertaking as well as the technical data processing and application problems affecting the overall task, to delimit the integration cycles required for an overall concept of automated data processing, to determine the requirements for vertical and horizontal integration, to develop a concept of alternative options, and to plan and gradually realise the individual projects, making the most of data stocks and programmes already in existence. Because of the labour-intensive production apparatus and the relatively high incidence of labour costs in the total expenditure of the German Federal Railway, the creation of a comprehensive staff information system assumes special importance. The present paper deals, from a data processing point of view, with the problems of data collection and input, data storage, administration and recovery as well as information demands, processing and presentation.

Mettner, W *Rail International* No. 4, Apr. 1974, pp 279-309, 10 Fig.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

17 071983
AUTOMATIC IDENTIFICATION OF RAILROAD CARS BY MEANS OF MICROWAVES [Automatische Wagenidentifizierung mit Mikrowelen bei der Eisenbahn]
A microwave system is described. Every car is equipped with a reflector, in which the 12-digit car numbers are fixed by the frequency distribution of 26 microwave resonators. When passing the sensing site, this reflector is interrogated by an fm microwave signal in the frequency band from 3. 1 to 4. 2 GHz. By the use of modern techniques and the integration of all system components, a reliable and maintenance-free system was developed which is economically suitable for railroads. [German]

Becker, F Garbrecht, K *Association Suisse des Electriciens Bulletin* Vol. 65 No. 8, Apr. 1974, pp 564-570, 4 Ref

ACKNOWLEDGMENT: EI (EIX740902374)
PURCHASE FROM: ESL Repr PC, Microfilm

17 072480
STATE OF RELIABILITY EFFORT OF THE EUROPEAN RAILWAYS
Reliability, in the sense of safety and punctuality, is the principal objective of railway management to keep ahead of competition. Reliability efforts of European railways and the impact of modern methods for improving reliability are discussed. Further progress in this field depends on modern information systems and complex data processing. The proposed European data-processing system and the already installed systems of several European railway authorities are introduced. In addition to safety, reliable systems were also shown to have the highest economic gain. Modern computers help to overcome the poor out-of-date information characterized by the high error rate of manual systems.

Genser, R Grassl, A *IEEE Transactions on Reliability* Vol. R23 No. 3, Aug. 1974, 5 pp, 5 Fig., 52 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

17 072563
ACI RESEARCH IS UNDERTAKEN AT SANTA FE
This report points out the factors that collectively control the sensitivity of Automatic Car identification (ACI) equipment and suggests corrective actions that should be taken. The advancements in electronics and optics since 1967 should be incorporated in the basic ACI system, it was reported. Suggested are ways of overcoming dirty labels, of increasing the sensitivity of scanners, and of altering the label colors to improve their readability.

Railway System Controls Vol. 5 No. 9, Oct. 1974, pp 14-19, 6 Fig.

PURCHASE FROM: XUM Repr. PC

17 072564
IST SHOWS PROMISE
The IST (Improved Surface Treatment) label for Automatic Car Identification (ACI) has been designed to increase readibility and greatly reduce maintenance requirements. Described is a method for applying an IST overlay to existing ACI labels; currently new or replacement labels must be of the IST formulation. The IST overlay not only protects the module surface but also seals the module edges to the surrounding plate.

Buck, NR (INFO, Incorporated) *Railway System Controls* Vol. 5 No. 9, Oct. 1974, 3 pp

PURCHASE FROM: XUM Repr. PC

17 072705
COMPUTER HELPS IN MANAGING RAILROAD WAGON STOCK [L'elaboratore vienw in aiuto nella gestione del parco ferroviario delle carrozze]
Even today, operation of railroad wagon stock suffers from unsatisfied requirements with respect to information. An analysis is made of the reasons and consequences of this fact and the information system projected by the Italian State Railways to ensure complete solution of this problem is described. Lastly, mention is made of the further requirements in the field of information with respect to passenger traffic operations and the criteria to be followed in order to satisfy them. [Italian]

Burgio, A *Ingegneria Ferroviaria* Vol. 29 No. 4, Apr. 1974, pp 19-23

ACKNOWLEDGMENT: EI (EI 74 065247)
PURCHASE FROM: ESL Repr. PC, Microfilm

17 072779
NEW DYNAMOMETER-CUM-RESEARCH CAR OF INDIAN RAILWAYS
A rather detailed description is given of a car for testing new classes of locomotives to determine their power characteristics. The Research, Designs and Standards Organization (RDSO), Ministry of Railways, Lucknow, undertook to design, develop and manufacture the car using local expertise available in the organization. Only the essential items of instrumentation have been imported. It is claimed that the scope of testing with this car is much wider than that with the conventional dynamometer cars available for import. Electronic/electrical transducers and recorders of digital as well as analog types are used for the measurement, computation, logging and recording of various quantities. The main parameters that are to be measured and recorded during tests with the new car include drawbar pull, speed, distance traveled, time, horsepower, work done, acceleration of the train, fuel/energy consumption of the locomotive, voltages, currents, frequency, power factor, energy consumption, temperatures, vibrations, stresses, pressures, deflections, etc. For certain instruments, radio telemetry is provided; for others, closed-circuit TV.

Mallya, BV (Ministry of Railways, India) *Institution of Eng (India) Journal, Mech Eng Div* Vol. 54 No. tMe5, May 1974, pp 214-218

ACKNOWLEDGMENT: EI (EI 74 071076)
PURCHASE FROM: ESL Repr. PC, Microfilm

17 072863
METHODIC PROGRAMME DEVELOPMENT WITH COMPUTER-CONTROLLED RAILWAYS SIGNALLING SYSTEMS [Methodische Programmentwicklung bei rechnergesteuerten Eisenbahnsignalanlagen]
Progress in data processing systems technology calls for an improvement in software production. The Author describes a methodic design procedure which offers high reliability, good checkability and scope for modification and revision, and also facilitates the transfer of the problem solution to another type of computer. [German]

Gottschalk, W *Eisenbahntechnische Rundschau* Vol. 23 No. 10, Oct. 1974, pp 396-401, 8 Fig., 5 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

17 072864
INFORMATICS IN SHORT-DISTANCE TRANSPORT [Informatik im Nahverkehr]
Discussed here are the problems of short-distance transport services as a fully-automated rail-guided system. The Author seeks, in a wholly general form, to set out the requirements which are important from the standpoints of the operator. [German]

Neubauer, R *Eisenbahntechnische Rundschau* Vol. 23 No. 10, Oct. 1974, pp 405-410

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

17 072866
STUDIES ON THE SOLUTION OF COMPLEX PROBLEMS OF RAILWAY OPERATION WITH ELECTRONIC COMPUTERS [Studien zur Losung komplexer Probleme des Eisenbahnbetriebs mit elektronischen Rechnern]
In the article the Author reviews the history and the objectives of the UIC's METRA study and discusses the results and the limitations of the first large-scale international study on computer control of railway operation and management. [German]

Bertrand, C *Eisenbahntechnische Rundschau* Vol. 23 No. 10, Oct. 1974, pp 402-404

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

17 072962
TRANSPORTATION NETWORK ANALYSIS-SYSTEM AND TERMINAL
Eleven addresses, followed by discussions, given at the meeting, held in April, 1969, of the RSMA, on the general subject of the application of systems analysis, the theory of graphs, and the computerisation theory of communications, to transport problems. The above brochure contains a list of the 50 previous publications of the RSMA which appeared between 1955 and 1969. The following are some of the most characteristic of the subjects dealt with:—W.P. Allmann. Foreword. The fundamental transport problem: way and works, rolling stock, methods of operating, its importance, methods of study—mathematical models, simulation, adaptation of the problem to the possibilities of computers.—A. Dooharian. Communication and control in an operational analysis. Connections between a national defence strategy and the transport problem.—W.H. Turner. Economics of the configurations of chain systems and the problem of point-to-point communications. A parallel between the the problem of the telephone system and that of the transport system.—R.S. Farnsworth. Optimised system of land and sea transport. Linear programming of the transport of a product to the ports in the United States, and from there to destinations inside the country. Study of the breaking down of a problem which is too large to be dealt with as a whole.—G.J. Ahrenholz. Systems analysis applied to operations in a sea port. Details of the TRANSIM model and application in a military port to the enbarkment of an infantry division.—D.J. Collins. The individual control of wagons, the basis for the efficient operation of a railway system. Details of the model used on the Canadian National.—E.C. Dwyer. Relations between the running of marshalling yards and headquarters. Elaboration of a complete railway operating system.—H.N. Shycon. The distribution system. Research into an optimum distribution strategy, taking into account marketing, selling points and the geographical situation of the producers, by means of computer simulation.

Railway Systems and Management Association Oct. 1969, 100 pp

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

17 072964
MODEL AND CALCULATING PROGRAMME FOR THE OPTIMUM FORMATION OF THROUGH GOODS TRAINS
The author commences by posing the problem of train formation, setting out a mathematical model describing exactly the problem to be resolved, and providing an actual example of the application of this model to the whole of the Swiss railway system. He obtains an approximately optimum solution and estimates the maximum possible divergence from the optimum. This study contributes towards a solution to the problems of the

centralized management of wagons in an operational manner, i.e., for daily operation.

Achermann, M *International Railway Congress Assn Monthly Bull* May 1969, pp 131-227, 10 Fig., 23 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

17 265388
TECHNOLOGY TRANSFER-TRANSPORTATION
Problems in the public transportation industry and refining methods for decreasing the time gap between the development and the marketing of new technology are considered. Eight NASA innovations are either being adapted for use on highways, railways, or rapid transit, or are already entering the marketplace. Chronologies for three of these programs are provided. (Author)
Semiannual Report.

Anyos, T Lizak, R Wilhelm, J
Stanford Research Institute, (SRI Proj. PYU-2201) NASA-CR-140049, Mar. 1974, 44 pp

Contract NASW-2455

ACKNOWLEDGMENT: NTIS (N74-33397/2ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

N74-33397/2ST, DOTL NTIS

18 052565
PRINCIPLES OF DEPRECIATION OF FIXED ASSETS
This subject is treated under the heading: (1) the concept of depreciation (conventional depreciation; development of the concept of depreciation; financing of the modernization and extension of fixed assets); (2) application of the theoretical principles to the railways taking into account their peculiarities (peculiarities of the railways; the problem of modernization and extension of capacity); and (3) conclusions (general principles; value to be depreciated; duration of depreciation; method of calculation; modernization and extension).

International Union of Railways 14, Jan. 1965, 14 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

18 052566
ECONOMIC CRITERIA FOR THE CHOICE OF INVESTMENTS IN TRANSPORT (PART TWO)
Many criteria are proposed to industrial authorities for the choice of investments. The purpose of this document is to ascertain which economic criteria permit all the relevant factors to be taken into account and to obtain the most accurate indications.

International Union of Railways 13-2, Jan. 1966, 38 pp, Figs.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

18 052570
ACCOUNTING METHODS FOR CALCULATING MANUFACTURING COSTS IN RAILWAY WORKSHOPS
These methods are outlined under the headings: (1) economic aspect of the problem of manufacture in railway workshops; (2) brief view of the activities of railway workshops; (3) calculation of manufacturing costs; (4) schedule for ideal manufacturing costs; (5) incomplete manufacturing costs; (6) complete manufacturing costs; (7) economic aspects of the use of manufacturing costs; and (8) conclusions.

International Union of Railways 15, Jan. 1967, 20 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

18 057434
CAPITAL BUDGETING OF MASS TRANSPORTATION SYSTEMS IN LARGE CITIES OF DEVELOPING COUNTRIES
A general systems approach for the economic analysis and evaluation of mass transportation systems is outlined. In this approach, the case of a large city in a developing country, with several mass transportation corridors and alternatives is considered. A deterministic, single objective planning model developed by MIT in the USA for highway projects is reviewed, adjusted and extended to fit the case of multiple objective mass transit systems in developing countries.

Sargious, MA Salinas, JJ
Systems Approaches to Developing Countries Symp Proceeding

ACKNOWLEDGMENT: EI (EIX740600696)
PURCHASE FROM: ESL Repr PC, Microfilm

18 057458
EFFECTS OF ENTERPRISE CONCEPTS ON INVESTMENTS IN FIXED RAILWAY INSTALLATIONS [Auswirkungen der Unternehmenskonzeption auf die Investitionen im Bereich der festen Bahnanlagen]
An extensive program of investment is at present planned—and partly also in execution—with the long-term aim of improving the economic situation of the German Federal Railway. The major tasks which will thereby result for the Ways and Works Department of the DB are dealt with here in their essentials, also the finance requirements and the agreed priorities. [German]

Muller, H (German Federal Railway) *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 1-7, 3 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

18 057506
ECONOMIC ASPECTS OF THE EUROPEAN RAILWAYS OF TOMORROW
The continually increasing traffic demands in passenger and goods traffic call for integrated planning of investments where, in addition to economic criteria applying to individual undertakings, socio-economic criteria as well as criteria outside the sphere of economics must be taken into account. By making the most of the possibilities of improved organization and rationalisation as well as of the potentialities, due to track guidance, of automation and applied cybernetics, it will still be possible to achieve considerable improvements in the performance of railway transport which also has environmental advantages. In high-speed long-distance passenger traffic, for instance, the attractiveness of the service (resulting, inter alia, in additional traffic generated by the increased speed) will have a decisive bearing on capacity utilization and, therefore, on productivity.

Heimerl, G (Karlsruhe University) *Rail International* No. 3, Mar. 1974, pp 207-210

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

18 057735
TRANSFERS OF AIR RIGHTS AND DEVELOPMENT RIGHTS
One of the most fertile areas for future air space development is over railroad rights of way and railroad yards. Frequently these properties are located in choice downtown locations or along rivers and other scenic locations that would lend themselves to development above the tracks. In many cases the railroad does not own a fee title, but has only an easement and use of the air space would not normally be consistent with the easement. Regulatory agencies may also be involved. The author discusses the entire problem of transfer of air rights, noting that care, foresight, meticulous attention to detail and application of imaginative real property title standards can not only avoid disaster, but should provide benefits and profits to the participants.

Pedowitz, JM (Title Guarantee Company) *Real Property, Probate and Trust Journal* Vol. 9 No. 2, June 1974, pp 183-201

ACKNOWLEDGMENT: Real Property, Probate and Trust Journal
PURCHASE FROM: American Bar Association 1155 East 60th Street, Chicago, Illinois, 60637 Repr. PC

18 057736
BUILDINGS ERECTED OVER RAILWAY TRACKS IN BIG CITIES
The erection of buildings above or along railway yards and tracks is an economic proposition. They may take the form of structures which link up with other forms of transport (bus stations, air terminals, parking garages or postal centers); or public or commercial administration offices, banks, department stores and other commercial buildings, hotels, exhibition centers or dwellings. The air space above and adjacent to both state-owned and private railway systems is in fact the largest and generally the only integrated free space in city centers. Such level areas occupied by dreary stretches of track block not only cross-communication, but urban renewal. Throughout the world many structures are being put up over railways.

Idelberger, K *Acier/Stahl/Steel* No. 5, May 1974, 11 pp, 17 Fig., 1 Tab.

PURCHASE FROM: Centre Belgo-Luxembourg d'Information de l'Acier 47 rue Montoyer, B-1040 Brussels, Belgium Repr. PC

18 057741
PRODUCTIVITY TRENDS IN THE CANADIAN RAILWAYS 1956-1972
This study is intended to convey a picture of the efficiency of all common railway carriers in Canada in a period of a considerable growth in the economy of the country. The study involved the extraction and analysis of a multitude of pertinent data in various fields of railway technology and economics.

Mendelsohn, M
Canadian Transport Commission 27, Nov. 1973, 90 pp, 26 Fig., 9 Tab., 21 Ref

ACKNOWLEDGMENT: Canadian Transport Commission
PURCHASE FROM: Canadian Transport Commission 275 Slater Street, Ottawa K1A ON9, Ontario, Canada Repr. PC

18 057813
TRANSPORTATION RATES AND COSTS FOR SELECTED VIRGIN AND SECONDARY COMMODITIES
The report summarizes a study that compared the transportation rates for competing secondary (scrap) and virgin materials in five industries: iron and steel, glass, paperboard, rubber, and aluminum products. The three major points researched in the study are: Whether rates are reasonable for each commodity; whether carriers discriminate against secondary materials in ratemaking to the benefit of the respective competing virgin materials; and the magnitude of the effect of transportation charges on commodity prices.

Abraham, DG Saunders, WB Woodall, TG
Moshaman Associates, Incorporated Final Rpt. 1974, 254 pp

Contract EPA-68-01-0790

ACKNOWLEDGMENT: NTIS (PB-233871/3)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-233871/3, DOTL NTIS

18 057815
TRANSPORTATION: IMPLEMENTING CHANGE IN FREIGHT RATE STRUCTURE WITH EMPHASIS ON UTAH'S AGRIBUSINESS
The document discusses the significance of agriculture in Utah, and transportation as it constrains or fosters economic growth. It presents the historical basis for present rate making practices, examines the need for considering alternative rate making procedures, and discusses the planning strategy to implement change in rate making structure.

Prepared in cooperation with Transportation Research and Marketing, Inc., Salt Lake City, and Utah State Dept. of Agriculture.

Taylor, MH Baker, FJ
Utah State University Report UES-Economics-20, Apr. 1974, 190 pp

Contract DOT-OS-30116

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-233661/8, DOTL NTIS

18 071761
DEPRECIATION VERSUS BETTERMENT ACCOUNTING FOR TRACK STRUCTURES
Much of the ICC-prescribed accounting established in 1914 remains basically unchanged today, particularly as it relates to betterment accounting for track structures. This accounting, say the authors, has led to misstatement of economic fact which have had serious adverse financial repercussions in terms of the industry's treatment under tax laws and its inability to maintain its financial strength through recovery of its capital investment. Determination of costs for adequate rate levels is also difficult. While switching to depreciation accounting by itself would not solve all problems, it would provide a better basis for making many crucial decisions important to the future of railroads.

Kujawa, LJ Wisniewski, HG
Andersen (Arthur) and Company Oct. 1974, 33 pp

PURCHASE FROM: Andersen (Arthur) and Company 815 Connecticut Avenue, NW, Washington, D.C., 20006 Repr. PC

18 071833
UNDERSTANDING TRANSPORTATION COSTS HELPS DOLLARS MAKE MORE CENTS
While it is difficult to measure transportation costs in total for the economy, the Transportation Association of America has published data on the overall role of transportation for many years. Analysis of TAA data shows that freight and passenger "bills" of the nation have stayed remarkably stable as a percent of the gross national product. In addition to accounting for some 20% of GNP, transportation costs are a vital factor in marketing and a major consideration in the location of manufacturing and in production costs. Often it is said the firms that think they don't need good transportation personnel are usually the ones that need it most of all.

Farris, MT (Arizona State University) *Defense Transportation Journal* Vol. 30 No. 5, Sept. 1974, PP 44-47, 1 Fig., 2 Tab.

PURCHASE FROM: National Defense Transportation Association 1612 K Street, NW, Washington, D.C., 20006 Repr. PC

18 072044
THE BENEFITS AND COSTS (AT THE NATIONAL LEVEL) OF GOVERNMENT IN THE NORMAL PROCESS OF SETTING FREIGHT TRANSPORT PRICES
This Round Table consists of a preliminary report, plus a summary of the discussion which followed its presentation. The report notes the lack of uniformity in types and methods of price controls, which vary with the aim of the policy and implementation considerations. Different sections consider price control policy as it might apply to railways as a monopoly, or to inland waterway and road transport only. In these hypothetical cases, optimal pricing policies, and hence methods of price control, differ. When all forms of transport are considered, it must be kept in mind that the market is, in large part, competitive, and any price controls may produce modal substitution. It is suggested that monopolistic modes, such as railways, should be required to charge enough to cover their marginal costs. Finally, the political considerations of transport policy are considered. Regional policies, for example, may alter price control policy. The discussion summary centers around the relationship between general economic and social policies and transport policy, the theory of optimum pricing of practical value for economic policy, and the quantitative and qualitative evaluation of costs and benefits from government intervention.

This is part of the ECMT Round Table series.

European Conference of Ministers of Transport #22, 40 pp

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Organization for Economic Cooperation and Devel Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006 Repr. PC

18 072048
REPORT ON THE COSTS OF THE INFRASTRUCTURE FOR RAILROAD, ROAD AND HIGHWAY, AND INLAND WATERWAY TRANSPORT IN THE FEDERAL REPUBLIC OF GERMANY
[Bericht ueber die Kosten der Wege des Eisenbahn, Strassen-und Binnenschiffsverkehrs in der Bundesrepublik Deutschland]
The Federal Ministry of Transport wanted to determine the comparative costs of the various transport infrastructures. The report was prepared by a study group in the Federal Ministry, but with regular consultations with representatives of the three major transport branches. Any significant disagreements between the study group and the three representatives are indicated in the report. The two purposes behind the study were to equalize competition between the various branches of transport by referring the costs of the transport infrastructures to their respective users and to have each of the three forms of transport attain economic self-sufficiency. The total cost of each transport infrastructure was composed of the marginal costs (costs which depend upon an increase in traffic) and capacity costs (building and maintenance costs). The income from taxes, tolls, and fares for each transport network was then subtracted from the networks total costs to determine the degree (in percentages) to which each network covered its costs. [German]

This report is the thirty-fourth in a series published by the Federal Minister of Transport in the Federal Republic of Germany. The entire series is called "Schriftenreihe des Bundesministers fuer Verkehr."

Federal Transport Ministry, West Germany July 1969, 139 pp, 32 Tab.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Federal Transport Ministry, West Germany Bad Godesberg, Repr. PC

18 072454
PROBLEMS MEASURING RAILROAD PRODUCTIVITY
The American railroads, once the carriers of virtually all intercity freight and a key to the country's economic growth, have been declining steadily in relative importance, as rival modes of freight transportation have expanded. This expansion has resulted not merely from the failure of railroads to compete more successfully, but also from fundamental changes in the economy. While the task force on rail productivity asserts that the Bureau of Labor Statistics output-per-man-hour series overstates the industry gains, evidence suggests this is not the case.

Brand, H *Monthly Labor Review* Vol. 97 No. 10, Oct. 1974, pp 26-32

PURCHASE FROM: Department of Labor Constitution Avenue and 14th Street, NW, Washington, D.C., 20010 Repr. PC

18 072701
ECONOMIC ASPECT OF THE HIGH-SPEED RAILROADS
[L'aspect economique des grandes vitesses ferroviaires]
High-speed railway transport is a profitable operation wherever valid markets exist, which is already the case of the major national or European lines. The cost involved operation of a railway line with trains running at 250-300 km/h are such that they provide an income higher than the cost of outlays for the infrastructure, thereby yielding a profit for new lines. However, high train speeds are not economically feasible because there is every reason to think that the increase in costs cannot offset the small increase in a potential market which is already practically covered at 300 km/h. Beyond the intrinsic profitability of such projects and the benefit which users will derive from high-speed trains, it is neccessary also to stress the benefit to the collectivity, whose development will be contributed to by high-speed overland transport with minimum expenditure and ecological disturbances. [French]

Roumeguere, P (French National Railways) *Travaux* No. 470, May 1974, pp 8-11

ACKNOWLEDGMENT: EI (EI 74 065244)
PURCHASE FROM: ESL Repr. PC, Microfilm

18 072721
THE RELATIONSHIP BETWEEN FREIGHT CAR COSTS AND TRAFFIC
The relationship between car costs and traffic is particularly relevant to railroad management decisions. The author observes that there are factors which are unaccounted for in traditioal accounting. It is suggested that linear programming might be applied to obtain the maximization of profits. Another approach is the investment model. This model has its place where the disaggregative type of data required for linear programming is not available. While more research should be conducted to develop both approaches for application estimating investment unit costs, there is a greater payoff to railroad management in emphasizing linear programming or, by extension, the operations research approach.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Ventura, JS (Interstate Commerce Commission)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 452-459, 1 Tab., Ref.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

18 072725
WHY RETIREMENT-REPLACEMENT-BETTERMENT ACCOUNTING SHOULD CONTINUE TO BE APPLIED TO RAILROAD TRACK STRUCTURE
The author concludes that the retirement-replacement- betterment method of depreciation for railroad track components reflects a reasonable and accurate charge against income. The present method is consistent with the ratable method of depreciation where mature asset accounts are involved. A huge, but inestimable expense would be incurred if it were attempted to maintain corporate records that itemize specific components of the track structure so precisely that they would be accurate for ratable depreciation. The years of changeover would produce operating results which would not be comparable with those for prior periods, serving neither the industry or investing public as railroads compete in capital markets.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Casey, RJ (Casey, Craig and Constance)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 246-253

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

18 072727
A NEW TOOL FOR RAIL OPERATIONS-STANDARD COST
While standard cost has not been widely used by transport industries, it has been generally adopted by manufacturing firms. The production of transportation services is a distinctive type of business, but the author explains that standard cost would aid in economic evaluation of capital projects, analysis of supporting facilities, examination of administrative costs and the relationship of tariffs to the costs of switching and linehaul operations.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Smith, JA, Jr (North Florida University, Jacksonville)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 254-262, 1 Fig.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

18 072728
FUNCTIONAL RAILWAY COST ACCOUNTING
The prescribed ICC accounting for railroads has been criticized by cost experts for years. While most industries have thoroughly overhauled their accounting systems every decade or so, railroads continue with the uniform system of accounts which is financial and historical rather than functional. The author cites the major deficiencies of the present system of accounts, noting particularly that system-wide costs should not be used for costing specific traffic. He advocates that the railroad industry, FRA and ICC move ahead toward a solution for this problem with the establishment of a new Functional Railway Cost Accounting and Statistical system.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Whitten, HO (Whitten (Herbert O) and Associates)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 263-275

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

18 080316
ECONOMIC ASPECTS OF THE INTERNATIONAL GOODS WAGON AGREEMENTS
At a time when investment capital is scarce and expensive, it is a particularly important task of management to try and insure that the investments not only pay for themselves but also, in addition, contribute towards the financial success of the undertaking. It is not always the case that the distribution of cost and revenue over the railways taking part in international traffic meets this requirement. It is true that the railway administrations continually try to achieve, through the international goods wagon agreements, an equitable compensation for the stand-by costs of the wagons. The contribution of the investments in goods wagons towards the financial success of the owning administration is, however, confined to the compensation in kind which can be achieved in terms of wagon-days. In view of the notorious imbalance in international traffic flows, such a compensation is, to a large extent, impracticable. This applies, in particular, to railways in centrally situated countries with heavy export traffic. From this economic point of view, the paper deals with the existing international goods wagon agreements and with the present projects for the extension of the West European wagon pool.

Krause, H *Rail International* No. 11, Nov. 1974, pp 717-720

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

18 080362
THE GAO TRANSPORTATION RATE AUDIT
Within its wide-ranging responsibility for maintaining surveillance over virtually all financial operations of the Government, the General Accounting Office performs a centralized postaudit of rates charged by common

and contract carriers for transportation services furnished for the account of the United States. In addition, it reviews, evaluates, and reports on the transportation activities of Government agencies and assists agencies in transportation matters. These transportation-related functions are performed by the Transportation and Claims Division.

Sullivan, TE (United States General Accounting Office) *Defense Transportation Journal* Nov. 1974, 10 pp

ACKNOWLEDGMENT: Defense Transportation Journal
PURCHASE FROM: National Defense Transportation Association 1612 K Street, NW, Washington, D.C., 20006 Repr. PC

18 080768
NEW RAIL TAX PROPOSALS
America's railways have tried for years to obtain basic tax reforms. These reforms would make it easier for railways to borrow money to improve the plant and to write off capital expenses more quickly. The article gives a detailed summary of the proposed reforms.

Modern Railroads Vol. 29 No. 10, Oct. 1974, pp 62-64

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

18 080778
ECONOMIC CRITERIA FOR THE DEVELOPMENT OF HIGH SPEED GROUND TRANSPORTATION SERVICES IN CANADA
The orderly development of high speed ground transportation services for meeting the evolving needs of Canada can take place only if the economics of such services are balanced with national goals. A study of system development involving multimodal alternatives for the Windsor-Quebec City corridor suggests that profitability criterion is inappropriate for modernizing passenger services. The incorporation of user benefits and in special cases other appropriate societal benefits in the assessment of services, it is suggested, is in line with the real meaning of economic efficiency. Comments are also made on the criteria for modernization of freight services. A closer scrutiny of efficiency and competition, the major themes of the 1967 National Transportation Act, suggests that a narrow definition of these themes coupled with inappropriate tools for implementing the policy has resulted in an ineffective policy. Suggestions for a forward looking policy are made in this paper which mostly center around balanced policy perspectives, effective planning for modernization and increased governmental control.

Khan, AM (Carleton University, Canada) *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 237-253, 2 Fig., 3 Tab., 21 Ref.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

18 080879
FREIGHT RATE INCREASES: CAN WE LEARN FROM PAST EXPERIENCE?
In this address before the AAR Treasury Division, the history of railroad industry attempts to raise rates sufficiently to increase the return on investment rather than merely covering increased costs is described. This effort was thwarted by government regulation which both held down the amount of increase and extended the time until any increase could become effective. Even within the industry there needs to be an awareness on the part of those responsible for pricing of the economic environment in which their decisions are being made and of the consequences of failure to meet the challenge of inflation in time.

Betts, WF (Association of American Railroads) *Railway Age* Vol. 175 No. 19, Oct. 1974, pp 42-43

PURCHASE FROM: XUM Repr. PC

18 080882
MISSING LINK IN PRICING: A FAIR RETURN ON INVESTMENT
Assuring an adequate return on investment has always been a problem in railroading—and even defining the adequacy of return has excited constant discussion. A.L. Scott, director and chairman of the finance committee of Burlington Northern, expresses his opinion on the need of an after-tax return of 12% or more to satisfy the needs for a capital-hungry railroad industry. The ICC has stated its goal is an industry return of 6% although it has actually not been higher than 4% in over 20 years. Scott notes that not only is the industry unable to recover the cost of fixed capital but is not even doing this for new capital being committed to the business.

Railway Age Vol. 175 No. 14, July 1974, pp 24-25

PURCHASE FROM: XUM Repr. PC

19 057565
DIRECT MANAGEMENT FROM ABROAD: THE FORMATIVE YEARS OF THE BRITISH COLUMBIA ELECTRIC RAILWAY
This is a case study of London-directed firm that supplied transportation, gas, and electric power in British Columbia. Its history suggests that, in a young and rapidly developing economy, control of a company's activities by outsiders who are chiefly concerned with long-term investment prospects may be of greater benefit to all than critics of absentee management are willing to admit. Informational and bibliographical notes accompany the article.

Roy, PE *Business History Review* Vol. 47 N June 1973, pp 239-259

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: Harvard Graduate School of Business Administration 214-16 Baker Library, Soldiers Field, Boston, Massachusetts, 02163 Repr. PC

19 057566
GEMS OF SYMMETRY AND CONVENIENCE: SO RICHMOND PROUDLY DESCRIBED ITS ELECTRIC TROLLEYS, THE FIRST TRULY SUCCESSFUL SYSTEM IN THE WORLD
Initiated in 1888, Richmond, Virginia's trolley system, featuring four-wheeled electric cars, was the pride of the city. Within scarcely three months after the system opened, it was transporting 12,000 passengers daily at speeds up to 15 miles per hour. Not only was it, for its time, the largest street railway in the world, it was also "the first trolley system anywhere to operate with a sufficient degree of reliability and economy to represent a truly practical means of urban transportation". The author places operation of this system in historical perspective and provides a fascinating account of early street railway transportation. As one might expect, there are excellent illustrations for the article. Accompanying the article is a column "Vanishing Americans", which gives location of still-operational trolley lines and trolley museums and a description of them. Also featured in this issue is a section in color titled "Old Post Cards Bring Back The Age of the Trolley" (pp. 25-32). The nostalgia power of this section is almost overwhelming, especially the tranquillity of "Rush Hour on West Superior Street, Cleveland, Ohio". Trolley enthusiasts should make this issue a collector's item.

Middleton, WD *American Heritage* Vol. 24 N Feb. 1973, 7 pp

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: American Heritage Publishing Company 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

19 072551
RAILWAYS OF CANADA
This history of the railways of Canada covers engineering, economic, and political considerations involved with the railroads. Good maps are provided to trace the development of the railroads, and are supplemented with illustrations reproduced from historical photographs. The book is an excellent history of the railways of Canada, and provides an insight to the two railway systems of present day Canada.

Legget, RF
David and Charles (Holdings) Limited 1973, 255 pp, Tabs., Phots., 1 App.

PURCHASE FROM: David and Charles (Holdings) Limited South Devon House, Newton Abott, Devon, England Repr. PC

19 080308
AMERICAN RAILROAD POLITICS. 1914-1920
Regulation of railroads has been an effort to make private corporations conform to the public interest in the view of those holding that special interests welded economic power to exploit the nation's riches. Regulations developed as a system of resolving differences among competing economic groups but the bargaining attendant to this, termed railroad politics, was aimed at controlling the decision making process. Until World War I the arena for resolution of railroad policy was the Interstate Commerce Commission; in 1918 and 1919 the government directly controlled and operated the industry. This book is aimed at explaining the change in the way by which policy disputes were resolved between 1914 and 1920. It is intended to put in proper perspective the interpretation of railroad affairs during the war years.

Kerr, KA
Pittsburgh University Press 1968, 250 pp

PURCHASE FROM: Pittsburgh University Press Pittsburgh, Pennsylvania, Repr. PC

19 081386
THE TRANSPORT REVOLUTION FROM 1770
This is a study that includes "all the principal forms of transport within Great Britain." Specifically, the ten chapters examine inland navigation before 1830, road transport before the railway age, coastal shipping, the foundation of the railway system, the economic and social effects of railways, road and water transport in the railway age, the relationship between government and the railways (1830-1914), the 1885-1939 development of motor transport, transport policy between 1914 and 1939, and transport developments from 1939 to 1970.

Barnes and Noble Books 1974, 460 pp

ACKNOWLEDGMENT: Journal of Economic Literature
PURCHASE FROM: Barnes and Noble Books 10 East 53rd Street, New York, New York, 10022 Orig. PC

19 260570
SOCIAL AND POLITICAL IMPLICATIONS OF NEW TRANSPORT TECHNOLOGIES
The mechanism of change in society is discussed in terms of power and interest groups, and some of the past changes in transport technology are examined in terms of the degree of threat posed to the established order and the interest groups benefiting from change. On the basis of such a power/benefit model, three of the new transport technologies which have been proposed—"guideway", "dial-a-bus" and "network cab," are discussed as to their likely social and political acceptability. The form of system likely to be applicable in Australian cities will depend upon developments in resource distribution and telecommunications which are not yet clear.

Harper, BCS (Western Port Regional Planning Authority)
Transportation Planning and Technology Vol. 2 No. 3, Mar. 1974, pp 165-172, 10 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

20 071785
EVOLUTION AND PROGRAMS OF THE SWISS FEDERAL RAILROADS [Evoluzione e Programmi delle Ferrovie Federali Svizzere]
With a documented examination of the main aspects of the Swiss Federal Railways, a picture is drawn of the evolution in the four-year period 1970-1973, also indicating the development programs in relation to the growing requirements of the transport market. Indicating problems and suggesting solutions, within the framework of the complex contingent national economic situation and of the characteristics of the international transit, the study mentions the prospects arising from the economic and social progress of the country, and from the recent agreement stipulated with the EEC: in particular the generally decided upon tunnel under St. Gotthard, which will provide another important line of communication between North and South Europe, through the Alpine chain.

Introna, S *Ingegneria Ferroviaria* Vol. 29 No. 2, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 802124)
PURCHASE FROM: ESL Repr PC, Microfilm

20 071832
ENLIGHTENED RAILROAD MARKETING
A series of seven presentations cover various facets of the topic: Marketing opportunities; the railroad market of the future; making the capital decision, pricing philosophy and concept; cost of idle time; the service guarantee; and importance of government policy. The chairman noted that "professional marketing people seek to define customer needs; design a product that can be sold at competitive yet profitable price; then sell the product or service." He added that while there have been railroad marketing innovations, this "has not changed the basic operations of railroading nor has it secured complete commitment to the marketing concept." The railroads cannot be "saved" into prosperity, but must be marketed into viability.

Railway Management Review Vol. 74 No. 1, 1974, 58 PP

PURCHASE FROM: Railway Systems and Management Association 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

20 072458
1972 CARLOAD WAYBILL STATISTICS. TERRITORIAL DISTRIBUTION, TRAFFIC AND REVENUE BY COMMODITY CLASSES
This publication is the first compilation of carload waybill statistics prepared under direction of the Federal Railroad Administration. The data have been complied from a sample of audited revenue waybills submitted to FRA by 77 railroads and is the documentation resulting in 222,325 carloads. The sample includes import, export, transit, rebilled and piggyback traffic in carloads terminated by line-haul railroads. Tabulations of territorial distributions utilize a computer-based Waybill Information Processing System (WIPS) developed under direction of FRA. WIPS will be applied to data for 1973 and subsequent years. To give a basis for comparison the statistics have been compared with ICC's Freight Commodity Statistics (QCS).

Inquires regarding this publication should be directed to Chief, Information and Analysis Division RA-53, Office of Economics, Federal Railroad Administration.

Federal Railroad Administration TD-1, May 1974, 222 pp, Tabs., 2 App.

ACKNOWLEDGMENT: FRA
PURCHASE FROM: FRA Repr. PC

20 072713
FACTORS INFLUENCING SHIPPING MODE CHOICE FOR INTERCITY FREIGHT: A DISAGGREGATE APPROACH
This study showed it is possible to construct models for shipper mode choice for intercity freight, using techniques borrowed from passenger transportation research. These techniques require data at a disaggregate level for their successful estimation. Models are good both in terms of explanatory and predictive ability. The marginal rates of substitution derived from these models provide information which is useful to the carrier in development of his service. While the results are based on specific commodities, there is the potential for application to a much wider spectrum.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Watson, PL (Northwestern University, Evanston); Hartwig, JC (Pullman-Standard); Linton, WE (Granite City Steel)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 139-144, 3 Tab., Refs.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

20 072723
A NATIONAL SURVEY OF INDUSTRIAL SHIPPERS CONCERNING TRANSPORTATION SYSTEM PERFORMANCE
One of the most glaring voids in transportation literature concerns the performance of transportation systems as perceived by the industrial user. These systems exist to meet the needs of the user and the 1974 National Transportation Report includes a segment devoted to the industrial shipper. The author explains the methodology for obtaining the Industrial Shipper Survey and its evolution from the inception in 1972.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Jones, JR (EDIT)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 290-294, 1 Tab.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

20 072731
FUNCTIONAL CLASSIFICATION OF GREAT LAKES COMMERCIAL PORTS
Ten selected activity variables for 42 commercial ports provided the necessary input for deriving a preliminary functional classification of Great Lakes ports based upon functions they presently provide. Ports of Chicago, Duluth-Superior, Milwaukee, Detroit, Toledo, Cleveland and Buffalo were clearly separated grom the rest in almost all dimensions. The resulting classification was found relatively stable for 1961 and 1971. Classification could not be so exact that it could be used for directing decision decisions on specific policy issues or levels of investment or governmental responsibilities. Stastistical techniques do aid in formulating a heirarchical classification suitable for structuring regional policy analysis.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Hurtendo, PS (Maryland University, College Park); Wegmann, FJ (Tennessee University, Knoxville)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 104-114, 7 Fig., 4 Tab., 11 Ref.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

20 080242
TRENDS IN WORLD SHIPPING WITH PARTICULAR REFERENCE TO LARGE CRUDE-OIL CARRIERS
The world total tonnages of both tankers and bulk carriers have increased at a higher rate than was forecast. The present tonnage and numbers of container ships are lower than were predicted. Revised forecasts of the possible short-term development of these and other classes of ships are made in the light of the 1974 world trade situation. Because of the great importance of the crude oil trade to NATO nations, several chapters are devoted to the oil trade in ships of over 60,000 tons. This part reviews the numbers and sizes of ships on each route, tanker terminals, and flags of registration. The problems of defending such ships are also briefly discussed. (Modified author abstract)

See also AD-731 015.

Burton, P
Saclant ASW Research Centre Memo. Rpt. SACLANTCEN-SM-50, July 1974, 30 pp

ACKNOWLEDGMENT: NTIS (AD-786010/9ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-786010/9ST, DOTL NTIS

20 080461
BN CASHES IN ON THE LOW-SULPHUR COAL BOOM
Both as a transport operator and the owner of mineral rights, Burlington Northern is well placed to benefit from the sharp rise in coal demand for power generation: "Anti-pollution restrictions on sulphur-emission have opened up new markets for the 36,000 million tons of recoverable low-sulphur coal in Wyoming and Montana, and BN is looking hard at electrification of the lines most effected by this revolution in the US energy market."

Lorentzsen, NM (Burlington Northern) *Railway Gazette International* Vol. 130 No. 11, Nov. 1974, pp 433-436

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

20 080654
SUMMARY OF NATIONAL TRANSPORTATION STATISTICS
The report is a compendium of selected national-level transportation statistics. Included are cost, inventory, and performance data describing the passenger and cargo operations of the following modes: air carrier, general aviation, automobile, bus, truck, local transit, rail, water, and oil pipeline. The report includes basic descriptors of U.S. transportation, such as operating revenues and expenses, number of vehicles and employees, vehicle-miles and passenger miles, etc. As its name implies, the report is a summary of a larger data base, consisting of time-series collected from a variety of government and private statistical handbooks. In this edition, the selected data cover the period 1962 through 1972.
See also Final rept. dated Nov 73, PB-226 747.

Gay, WF
Transportation Systems Center Final Rpt. DOT-TSC-OST-74-8, June 1974, 130 pp

ACKNOWLEDGMENT: NTIS (AD/A-001017/3ST)
PURCHASE FROM: NTIS Microfiche, Government Printing Office North Capitol Street between G and H Streets, NW, Washington, D.C., 20401 Repr. PC
AD/A-001017/3ST, DOTL NTIS, 5000-00085

20 081133
INTEGRATED ANALYSIS OF SMALL CITIES INTERCITY TRANSPORTATION TO FACILITATE THE ACHIEVEMENT OF REGIONAL URBAN GOALS
The research focuses upon intercity transportation and its relationship to socioeconomic characteristics in essentially rural regions. The study area consists of the nine administrative planning regions in Iowa that do not include a community of 50,000 population or more. The research objective was to relate the intercity transportation system of small urban communities to their ability to attract and absorb growth. This relationship, as established, suggested a structured set of conditions regarding transportation planning, regulation, policies, and programs that would be supportive of growth in the study regions and in similar rural regions in other states.

Brewer, KA Richards, RO Carstens, RL Ring, SL Millett, MLJ
Iowa State University, Office of the Secretary of Transportation, (ERI-1034) Final Rpt. ISU-ERI-AMES-74067, June 1974, 653p

Contract DOT-OS-30106

ACKNOWLEDGMENT: NTIS (PB-236612/8ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236612/8ST, DOTL NTIS

20 081183
INTEGRATED ANALYSIS OF SMALL CITIES INTERCITY TRANSPORTATION TO FACILITATE THE ACHIEVEMENT OF REGIONAL URBAN GOALS
The research focuses upon intercity transportation and its relationship to socioeconomic characteristics in essentially rural regions. The study area consists of the nine administrative planning regions in Iowa that do not include a community of 50,000 population or more. The research objective was to relate the intercity transportation system of small urban communities to their ability to attract and absorb growth. This relationship, as established, suggested a structured set of conditions regarding transportation planning, regulation, policies, and programs that would be supportive of growth in the study regions and in similar rural regions in other states.

Brewer, KA Richards, RO Carstens, RL Ring, SL Millett, MLJ
Iowa State University, Office of the Secretary of Transportation, (ERI-1034) Final Rpt. ISU-ERI-AMES-74067, June 1974, 653p

Contract DOT-OS-30106

ACKNOWLEDGMENT: NTIS (PB-236612/8ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236612/8ST, DOTL NTIS

20 081207
BITUMINOUS COAL AND LIGNITE MINE OPENINGS AND CLOSINGS IN THE CONTINENTAL UNITED STATES. 1970, 1971 AND 1972
The six tables of this report summarize data on mine openings and closings, showing the impact of such actions on state production and employment in 1970, 1972 and 1972. The deep mine closures and loss of production are attributed to seven major causes, which are detailed in the tables. The ratio of planned production from deep and surface mines opened to actual state production is also shown.
Appeared in Mineral Industry Survey.

Department of the Interior Nov. 1973, 17 pp, 6 Tab.

PURCHASE FROM: Bureau of Mines C Street Between 18th & 19th, NW, Washington, D.C., 20240 Repr. PC

20 081210
THE RESERVE BASE OF BITUMINOUS COAL AND ANTHRACITE FOR UNDERGROUND MINING IN THE EASTERN UNITED STATES
The coal reserve base is defined for coalbeds having sufficient thickness for underground mining within a depth range compatible with economic recovery. The reserve data are compiled by the Federal Bureau of Mines by updating and reevaluating previous estimates of the U.S. Geological Survey, State geological surveys, and others. Through the application of computer techniques, the tonnages are compiled by State, county, coalbed, and rank. Coal reserve base is alloted to sulfur categories by a statistical apportionment of data from available Bureau of Mines reports and records. The coal reserve base in those States east of the Mississippi River, minable by underground methods, is estimated to be 169 billion tons in coalbeds greater than 28 inches in thickness to a maximum depth of 1,000 feet. Excluding those coals in reliability categories other than measured and indicated, the underground reserve base includes 162 billion tons of bituminous coal and 7 billion tons of anthracite. Of the total, 27 billion tons contains 1.0 percent or less sulfur. Most of this low-sulfur coal is in the southern Appalachian area. Approximately 16 percent of the underground reserve base is without available analyses. Included in this report is a glossary of terms applicable to a classification system for coal resources and reserves. The purpose of this system is to provide a common yardstick for determining coal resources and reserves.

Bureau of Mines Info Circular 8655, 1974, 428 pp, Tabs., 229 Ref.

ACKNOWLEDGMENT: Bureau of Mines
PURCHASE FROM: Government Printing Office North Capitol Street between G and H Streets, NW, Washington, D.C., 20401 Repr. PC
2404-01691, DOTL RP

20 081633
THE CHANGING MARKET FOR RAIL FREIGHT TRANSPORT
This paper examines the changing markets that characterize the American economy and their effects on rail freight transport. As an economy matures, the volume of freight normally fails to grow in proportion to the rate of economic growth. The geographic distribution of economic activity also changes over time, partially in response to the changing composition of economic activity and partially in response to the changing character of the transport system. To compound the problems of the established modes, the emergence of new modes of freight transport and of transport alternative circumscribes the freight markets in which the older modes enjoy cost and service advantages. This paper discusses two categories of freight traffic: bulk commodities and manufactures. Competition for bulk commodity traffic is principally among railroads, water carriers, and pipelines, although the relatively high-cost truck mode has made inroads into

this traffic in certain cases. Manufactures typically move in packages or discrete units; shipments tend to be of lower volume than bulk-commodity flows, smaller, and less regular. The number of segments of the freight market in which the railroads hold a commanding economic advantage has diminished during the postwar period. The newer modes-the truck, the pipeline, the airplane-have been developed to satisfy specialized transport needs, traffic that the railroads served only so long as these other modes were nonexistent. The evolution of transport technology has in fact paralleled the evolution of freight demands. Trucking particular is consistent with almost all important changes in the freight market described. The final discussion in this paper looks to the futures of the railroad and trucking industries and outlines a number of opportunities to be gained by changes in policy and practice.

This is one of four articles contained in the TRB publication "Intercity Freight Movement by Rail and Highway", RRIS #081631.

Morton, AL (Harvard University) *Transportation Research Record* #511, 1974, pp 1-12, 7 Tab., 13 Ref.

PURCHASE FROM: TRB Repr. PC

20 081634
THE RAILROADS' ROLE IN THE MOVEMENT OF MERCHANDISE FREIGHT

The purpose of this paper is to examine ways in which railroads might (a) improve service and (b) improve capital utilization without increasing long-run total costs. Rail freight costs and truck costs are compared in considering the effects of a shift from truck to rail. In order to examine the full economic cost approach to rail and truck capital investment it is necessary to include, first, the recovery over the expected economic life of each investment of the amount of capital that would be required to replace that investment today and, second, an additional cash flow adequate to provide an average return on the investment of 9 percent after taxes. The justification for applying the capital cost approach is (a) to make enough money to replace equipment as it wears out at the prices that will prevail at that time and (b) to make enough profit to guarantee continued accessibility to the capital market. The validity of this approach to the cost of doing business has long been recognized in many capital-intensive industries but not in the railroads. This paper also describes some of the reasons rail car utilization is low, among which are (a) the low average line-hual speed, (b) the fact that 62 percent of the days attributed to line-haul are spent standing and being switched in intermediate yards, and (c) the fact that the average line-haul train is 1 hour late for every 200 miles traveled. There are many ways in which the railroad industry can and should improve utilization. This paper examines some methods for accomplishing this, including car control systems, operating strategy changes, physical improvements, and pricing changes that reflect and encourage actual equipment cost levels.

This is one of four articles contained in the TRB publication "Intercity Freight Movement by Rail and Highway", RRIS #081631.

Deboer, D (Federal Railroad Administration) *Transportation Research Record* #511, 1974, pp 13-19, 10 Ref.

PURCHASE FROM: TRB Repr. PC

21 052503
CONTINUOUS MEASUREMENT AND CONTROL OF THE SPEED OF WAGONS SHUNTED OVER BUMPS. INFLUENCE OF THE FUTURE GOODS WAGON ROLLING STOCK WITH AUTOMATIC COUPLERS ON THE CAPACITY OF AUTOMATIC HUMP SYSTEMS
The report concerns the capacity of automatic hump yards for the future, modernised goods wagon rolling stock with automatic couplers and roller bearing axle boxes; the length of the wagons will generally exceed that of the present wagons. A study is made of the system with target braking and of that with controlled conveyance. Calculations are made of the attainable distances to be run in the sorting sidings according to the example of an ideal train. The joint running of wagons with automatic couplers after the impact in the sorting sidings is shown in a nomogram, in relation to the masses, the resistance to rolling, the gradient of the sorting siding and the impact speeds delta v = 1.5, 2.0 and 3.0 m/s. In a special section the separation on the hump is described.

International Union of Railways D74/RP6/E, Apr. 1973, 51 pp, Figs., Tabs., 6 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

21 057343
FREIGHT FACILITY COMPENDIUM
As a first step in developing a planning program for freight transport in the Chicago region, the Chicago Area Transportation Study (CATS) and the Lake-Porter County Regional Transportation and Planning Commission have surveyed the local freight industry to inventory the freight network and to determine the nature of private planning in the region. This report synthesizes results of that survey. It is a compendium of the local freight industry's projected facility investment programs. It provides a forecast of freight facility development through 1975 based on the transport industry's current perception of the regional demand for its services. The report concludes that private planning tends to perpetuate existing patterns of location and service. Comprehensive, cooperative, multimodal planning, which provides a good climate for innovation, may yield guidelines for facility investment which will promote greater efficiency in the regional freight complex. The long-range freight planning effort being formulated by the CATS is directed toward this goal.

Blaze, JR Behrens, JW Creed, SL DeGeeter, R Thorne, NR
Chicago Area Transportation Study, Lake-Porter County Regional Transp & Planning Com Tech. Rpt. CATS 354-04, Apr. 1972, 100 pp, Figs., Tabs., Refs.

ACKNOWLEDGMENT: Chicago Area Transportation Study
PURCHASE FROM: Chicago Area Transportation Study 230 North Michigan Avenue, Chicago, Illinois, 60601 Repr. PC

21 057346
MEASURING THE PRODUCTIVITY OF U.S. SHIPPING FIRMS 1966-1970
The focus of this study is the shipping company as an operating unit, and the industry as a whole. The study examines the relationship between the shipping company and its environment. The environment includes such things as the nature of the market or markets within which the firm is operating and the amount and type of competition which it faces within these markets. Other environmental factors are the changing technological requirements for operation with new developments such as containerization, institutional arrangements such as conferences which affect a firms' operating procedures, and government policies and regulations.

Katz, H Fettner, L
United States Merchant Marine Academy, (NMRC-274-04-04-00) Final Rpt. Sept. 1973, 154p

ACKNOWLEDGMENT: NTIS (COM-74-11016/4)
PURCHASE FROM: NTIS Repr. PC, Microfiche
COM-74-11016/4, DOTL NTIS

21 057404
INTERNAL TRANSPORTATION SYSTEMS IN AN IRON AND STEEL PLANT WITH AN ANNUAL PRODUCTION OF ABOUT 10 MILLION TONS [Organisation des transports interieurs dans une usine ayant une production annuelle de l'ordre de 10 millions de tonnes]
The integrated steel plant discussed is the Fos-sur-Mer works which started operation in Nov 1973 and is expected to produce seven million tons of oxygen steel ingots annually. The plant's rail and road systems, the railway rolling stock and the road vehicles are described, as well as the control and telecommunication systems. [French]

Houy, R *Revue de Metallurgie* Vol. 71 No. 2, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 606539)
PURCHASE FROM: ESL Repr PC, Microfilm

21 057406
MAINTENANCE COSTS FOR INTERNAL TRANSPORTATION BY RAIL, AND METHODS FOR INSURING MINIMUM MAINTENANCE COSTS [Les frais d'entretien relatifs aux transports interieurs par voie ferree. Mesures qui permettent d'obtenir un cout d'entretien minimum]
This Benelux report of maintenance costs for the engines, rolling stock, rails, signal systems, etc, of internal railway systems of steel plants arrives at a figure of 40% of the total cost of operating this means of transportation. The figures used are those for 1968 to 1971. [French]

Revue de Metallurgie Vol. 71 No. 2, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 606542)
PURCHASE FROM: ESL Repr PC, Microfilm

21 057428
CRITERIA FOR THE ANALYSIS OF CONFLICTS OF TRAFFIC ON RAILWAY LINES AND AT RAILWAY JUNCTIONS [Criteri per un'analisi dei conflitti di circolazione nelle linee e nei nodi ferroviari]
The adequacy of the railroad plant and installations (lines, stations), destined for the running of trains, depends to a large extent on the probability of effective conflicts in the train traffic flowing and meeting between them by reason of the schedule and itinerary; the relationships between the number of trains and capacity (understood in the usual sense) of the installations, represents, on the other hand, a less significant index of traffic difficulties. Starting from this premise, an exposition is given of some procedures designed to determine the number of circulation conflicts within lines and stations under the assumption of foreseeable variations, as compared with the actual situation, of certain traffic characteristics. It is also proposed to adopt new criteria for the calculation of the capacity of lines and stations. [Italian]

Mazzone, R *Ingegneria Ferroviaria* Vol. 28 No. 9, Sept. 1973

ACKNOWLEDGMENT: EI (EI 74 602765)
PURCHASE FROM: ESL Repr PC, Microfilm

21 057430
SP MAKES REMOTE AIR BRAKE TESTS
Southern Pacific has incorporated its new remote-controlled Terminal Air Brake Test System. Once the head end of the train is coupled to the brake test system, an automated panel, operated by the lead carman in the Trim Tower, is programmed to perform the charging-reducing of the brakepipe and leakage air tests. Automatic testing procedure is described.

Railway Locomotives and Cars Vol. 148 No. 3, Mar. 1974

ACKNOWLEDGMENT: EI (EI 74 601962)
PURCHASE FROM: XUM Repr. PC

21 057453
DEVELOPMENT AND MANUFACTURING OF MACHINES AND EQUIPMENT IN THE GERMAN FEDERAL RAILWAY [Entwicklung und Bau von Fertigungsmitteln bei der Deutschen Bundesbahn]
For the maintenance of railway rolling stock, special machines, measuring apparatus and other appliances are required. These are mostly not available commercially and owing to the small numbers used they are generally produced by the railways themselves. The DB, for example, has set up a special department for this purpose in the Opladen repair workshops. A few of the more important machines and equipment made there are described. [German]

Dache, A Dern, G *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 55-58, Phots.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

21 057486
WOULD YOU BELIEVE LTL?
Most railways abandoned LTL (Less than Truckload) shipments twenty-five years ago as hopelessly unprofitable. However, Western Pacific Railroad has successfully begun a LTL service between Oakland and Salt Lake City (925 miles). The railroad was burdened with a westbound trailer traffic that was one-third larger than the eastbound traffic. The LTL service was begun in an attempt to offset this inequality.

Ford, N *Modern Railroads* Vol. 29 No. 6, June 1974, pp 54-55

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

21 057494
"TRACKLESS" CAR SHOP
The Safety Railway Service Company at Victoria, Texas has built a car shop without tracks. Instead, the company uses a straddle crane to lift cars off their trucks and place them in the shop. This system allows for greater flexibility in production line programing.

Progressive Railroading Vol. 17 No. 5, May 1974, pp 33

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

21 057497
HOW TO RUN A RAILROAD IN THE NORTHEAST
The author proposes an integral container train system to serve the Northeast Corridor and much of the other northeast area. New system routes are detailed, and the problem of Corridor passenger operations interfering with freight services is brought out. Some basic costs and market projections are made, but not in detail.

Kneiling, JG *Trains* Vol. 34 No. 10, Aug. 1974, pp 20-26, Figs., Phots.

PURCHASE FROM: Kalmbach Publishing Company 1027 North 7th Street, Milwaukee, Wisconsin, 53233 Repr. PC

21 057523
POLAND'S BIG INVESTMENT WILL BOOST FREIGHT CAPACITY
Opening next month of the new line between Zawiercie and Radzice will bring the first fruits of Polish State Railways' massive investment in a new central trunk route linking major coal-producing and industrial areas.

Zijfryd, M (Ministry of Transport, Poland) *Railway Gazette International* Vol. 130 No. 6, June 1974, pp 213-216, Figs.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

21 057553
PLANNING FOR FREIGHT FACILITIES
Estimating future travel demand and translating such evaluations into plans for highway and transit systems is a recognized planning function in regional areas like Chicago. Less glamorous, but equally important, is the need to provide an adequate supply of regional facilities to move goods. The distribution networks of the goods movement industry are facing critical problems. Congested facilities hamper efficient merchandise handling at Chicago's aircargo terminals. Many rail yards, built to meet the demands of yesterday, today suffer from a combination of poor location and either overflow or under-utilization. Waterway facilities are also facing technological obsolescence Pipelines are continually being designed to satiate the region's bulging demand for natural gas and petroleum. The trucking industry daily shares the commuter's frustration with congested highways.

Project conducted jointly by the staffs of the Chicago Area Transportation Study and the Lake-Porter County Regional Transportation and Planning Commission. This document is one of a series reporting on the joint planning program for the Chicago-Northeast Illinois-Northwest Indiana Region.

Blaze, JR Raasch, N
Chicago Area Transportation Study Proj. Rpt. CATS-LPCRTPC, June 1970, 24 pp, 6 Fig., 1 App.

ACKNOWLEDGMENT: Chicago Area Transportation Study
PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

21 057554
1972 NATIONAL TRANSPORTATION NEEDS STUDY. MANUAL D: OTHER INTERCITY TRANSPORTATION TERMINALS, RELATED FACILITIES AND EQUIPMENT
In the spring of 1971, the United States Department of Transportation undertook a study to establish a national transportation data base for making legislative and expenditure recommendations to Congress. This study is the first of a continuing needs assessment program with biennial reports to Congress. The Manuals cover the following topics: Manual A-General Outline, Manual B-Highways, Manual C-Transit, Manual D-Airports and Other Intercity Terminals. The Chicago Area Transportation Study staff prepared and submitted material for the Chicago region to the State of Illinois coordinator's office. This report covers the needs estimate of Other Intercity Terminals. The foundation of this report is the work of the CATS Freight Program.

For this and complimentary reports address all inquiries to the Freight Section of the CATS.

Behrens, JW Blaze, JR Creed, SL Thorne, NR
Chicago Area Transportation Study July 1971, 15 pp, Tabs., 3 Apps.

ACKNOWLEDGMENT: Chicago Area Transportation Study
PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

21 057571
THE INTEGRATION OF LAND AND SEA TRANSPORT, TOGETHER WITH INDUSTRIAL DEVELOPMENT
This Paper describes maritime industrial development areas (MIDAS)-a concept of the National Ports Council which would enable bulk-consuming industries, and consequentially the economy of Britain, to derive maximum economic advantage from the use of large ships for import of cargo in bulk. Examples of similar developments overseas are given. Progress to date is summarized briefly.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Gifford, JM (National Ports Council)
Institution of Civil Engineers Proceeding 1972, pp 59-68, 5 Fig.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

21 057576
REGIONAL TRANSPORTATION INTERIM PLAN AND PROGRAM
Events of recent years have brought about significant changes in the scope and scale of transportation planning in the Chicago region. These are most apparent in the change from four functionally defined planning regions to one six county region in Illinois and the inclusion of freight and aviation facilities as major elements of the transportation plan. While less evident, the importance of long range capital programming must also be acknowledged as part of the planning process. The purpose of this report is to coordinate and consolidate transportation planning and to set the stage for planning activities during the year and years to follow. The plan is a composite of existing plans and relevant issues in the region.

This report was prepared by CATS, sponsored by the agencies on the Policy Committee in cooperation with the U.S. Department of Transportation Federal Highway Administration.

Chicago Area Transportation Study, Lake-Porter County Regional Transp & Planning Comm Mar. 1971, 74 pp, Figs.

ACKNOWLEDGMENT: Chicago Area Transportation Study
PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

21 057577
THE POTENTIAL BENEFITS OF RAILROAD FACILITY CONSOLIDATION
This report is one of a series on the topic of freight transportation in the Chicago metropolitan area. The purpose of these reports is to stimulate industry and government towards the development of long-range planning. The CATS staff is presently analyzing commodity movement within the Chicago region. One specific area of concern has been the corporate and community stake in planning for transportation land requirements. This paper focuses on the potential benefits to be derived from cooperative intercompany evaluation of facilities required for the efficient movement of commodities by rail.

Prepared by CATS, sponsored by the agencies on the Policy Committee in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

Halagera, R Johnson, C
Chicago Area Transportation Study CATS 332-11, June 1972, 68 pp, Figs., 6 App.

ACKNOWLEDGMENT: Chicago Area Transportation Study
PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

21 057669
THE FUTURE OF RAILROAD FREIGHT TRANSPORTATION IN THE UNITED STATES
In any country characterized by a dynamic economy and rapid technological change, change in traditional flows of traffic and in established transportation practices is inevitable. In America, the particular combination of affluence and a set of institutions erected to control or penalize a once-monopolistic, privately-owned railroad industry has resulted in the United States leading the world out of the railroad era. Commitment to air transportation, and more particularly to the highway, came earlier and more massively in the United States than anywhere else. This is indeed ironic, for in the pre-automobile era, the United States provided the classic example of a country whose development was organized around its railroads. It is also true that by the 1930's American railroads had achieved an excellence of plant, carried a volume of freight, and achieved standards of performance that were not equalled in any other country.

This article appeared in Geographic Perspectives on the Future of American Railroads, Proceedings of the Special Session of the Annual Meeting of the Association of American Geographers, Atlanta, Georgia, April 1973.

Wallace, WH (New Hampshire University)
San Diego State University Proceeding #1, Apr. 1973, pp 22-36, Refs.

ACKNOWLEDGMENT: Association of American Geographers
PURCHASE FROM: San Diego State University Department of Geography, San Diego, California, Repr. PC

21 057670
IMPLICATIONS OF THE BRITISH FREIGHTLINER FOR THE FUTURE OF AMERICAN RAILROADS
Containerization is, to most observers, the most significant innovation in freight movement in the last two decades. Whether one considers road, rail, air or sea modes of transport, containerization and the accompanying advantages of fast, efficient intermodal transfer of cargo have prompted more restructuring of operational procedures and freight distribution patterns than any other transport innovation of recent history. This study focuses on perhaps the most interesting example of overland container transport to date, the Freightliner system of Great Britain.

This article appeared in Geographic Perspectives on the Future of American Railroads, Proceedings of the Special Session of the Annual Meeting of the Association of American Geographers, Atlanta, Georgia, April 1973.

Hatchett, RL (United States Air Force Academy)
San Diego State University Proceeding #1, Apr. 1973, pp 37-57, 5 Fig., 7 Tab., 11 Ref.

ACKNOWLEDGMENT: Association of American Geographers
PURCHASE FROM: San Diego State University Department of Geography, San Diego, California, Repr. PC

21 057712
CP CONVERTS TO "ONE-SPOT" CAR REPAIR
CP Rail recently opened two "one-spot" car repair shops at Windsor, Ontario and Calgary, Alberta. These small repair shops are designed to handle light repairs up to one hour, such as wheel changes and brake checks. These shops will reduce "back order" delays and increase car utilization. Five more shops are planned.

Progressive Railroading Vol. 17 No. 7, July 1974, pp 43-44

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

21 057745
18,000 TONNE ORE TRAINS IN AUSTRALIA
Over its seven-year existence, northwestern Australia's Hamersley Iron Railway has handled steadily increasing iron ore traffic until its gross tonnage reached an estimated 57.6 million during 1974. This 388-km high-capacity railroad is confronted with special problems of geographical isolation, harsh climate and high-growth rate. While in original design all equipment and track were based on US standards, as time passes, more European practices are introduced. The railroad is already studying new car designs and ultimately may consider doubletracking and other means of increasing capacity.

Curlewis, WPC *Railway Engineering Journal* Vol. 3 No. 3, May 1974, pp 4-23, 20 Fig., 3 App.

PURCHASE FROM: ESL Repr. PC, Microfilm

21 057746
RAIL INTERMODALISTS SEE CONTAINERS AS PROFITABLE, BUT WITH PROBLEMS
The outook for domestic container traffic on U.S. railroads is examined by intermodal service directors of nine lines as they discuss four major problem areas: Domestic containerization is generally not seen as a short-term growth situation; there are a variety of obstacles to continued growth of both container and trailer traffic; railroads generally report that container traffic is profitable; but service changes and regulatory freedom would enable railroads to increase trailer and container traffic.

Container News Vol. 9 No. 8, Aug. 1974, pp 9-12

PURCHASE FROM: Communication Channels, Incorporated 461 8th Avenue, New York, New York, 10001 Repr. PC

21 057855
BRICKS BY FLETLINER
Britain's largest brickworks is now served by the Fletliner rail-container service developed jointly by London Brick Company and Freightliners Ltd. The ten trains operated weekly move the equivalent of 300 large highway tractor/trailer units. This specialized intermodal operation has now become an integral part of the distribution system for the manufacturer.

Modern Railways Vol. 31 No. 311, Aug. 1974, pp 312-315, Phots.

PURCHASE FROM: XUM Repr. PC

21 057856
FREIGHTLINER PROGRESS
While the Freightliner intermodal concept evolved in the early 1960s by British Rail, operation passed in 1968 to a new company, Freightliners Ltd. under the control of the state-owned National Freight Corporation which is primarily concerned with road-haulage operations. Currently 175 services are operated daily over 75 routes between 29 terminals. At the end of 1973 there were 7,665 containers, 2,700 units of highway equipment and over 630,000 containers carried during the year. The operation showed a substantial profit in 1973 and the fuel shortage presages even higher traffic. Development of a small-container intermodal system and building of the Channel Tunnel are seen as further enhancing the growth of freightliner.

Modern Railways Vol. 31 No. 311, Aug. 1974, pp 315-318, Tabs.

PURCHASE FROM: XUM Repr. PC

21 057883
ECONOMIC EFFECTIVENESS OF THE APPLICATION OF LARGE-CAPACITY CONTAINERS FOR MARINE TRANSPORT
Successful development of cargo shipment and the introduction of large capacity containers to mixed rail and marine transport is examined. One of the conclusions drawn from this study is that of achieving the greatest effectiveness of transportation of piece goods by using universal containers, particularly those weighing 10 and 20 tons gross.

Trans. of Ekonomika i Ekspluatatsiya Morskogo Transporta (USSR) n24(30) p19-43 1969.

Grabarnik, IA
Army Foreign Science and Technology Center FSTC-HT-23-2397-72, May 1974, 35p

ACKNOWLEDGMENT: NTIS (AD-781025/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD-781025/2, DOTL NTIS

21 071751
RAIL CAR ALLOCATION IN NORTH DAKOTA: PROCEDURE, PROBLEMS, AND PERFORMANCE
Railroad freight car allocations for grain handling in North Dakota are examined to determine the system's effectiveness and to determine if any inequities result in the marketing of grain. Inequitable allocations are an alleged outgrowth of the boxcar shortage with rules of critical importance in periods of limited car supply. Under such conditions, elevator operators are extremely sensitive and any hint that a competitor is getting more than his fair share of equipment brings accusations of discrimination. It was determined that railroads were not discriminating against branch line elevators in favor of of main line elevators. The Soo Line was found to provide customers with substantially more car carrying capacity than was the case with shippers on Burlington Northern.

Tosterud, RJ Nichols, RQ (Upper Great Plains Transportation Institute) *ICC Practitioners' Journal* Vol. 41 No. 6, Sept. 1974, pp 676-683, 2 Tab.

PURCHASE FROM: Association Interstate Commerce Comm Practitioner 1112 ICC Building, Washington, D.C., 20423 Repr. PC

21 071753
CONSOLIDATION OF URBAN RAIL FACILITIES
Our present urban rail systems were developed by a number of independent competitive companies without coordination or overall planning, resulting in a considerably overbuilt plant. Changing patterns in distribution have not been reflected in changes in our urban rail systems. Past experience with facility consolidation through such methods as the joint terminal operating company have been unsatisfactory due to resultant high costs and poor service. These proposals have also failed to recognize many of the interests involved in facility changes and have consequently engendered substantial opposition. This paper proposes a method whereby the deficiencies of past terminal companies can be corrected and deals with overcoming opposition from those interests which may be expected to oppose rationalization of the urban rail plant.

This is a paper from the Engineering Foundation Conference, Goods Transportation in Urban Areas, Berwick Academy, South Berwick, Maine, 5-10 August 1973. The conference was sponsored by the Federal Highway Administration, DOT.

Wiersema, RH (Illinois Central Gulf Railroad)
Engineering Foundation Conferences Proceeding FHWA-32-01-23, Feb. 1974, pp 253-264

ACKNOWLEDGMENT: Federal Highway Administration
PURCHASE FROM: NTIS Repr. PC

21 071762
CONTAINER CERTIFICATION RULES REPLACE EARLIER ABS GUIDES
The 1974 Rules for Certification of Cargo Containers provide for the latest developments in container technology and the ISO International Standards. Prepared by the American Bureau of Shipping Special Committee on Cargo Containers, the Rules provide a structural certification that containers are built, tested and inspected by a surveyor of the Bureau and that his certification represents a quality of construction required by the Bureau. The 1974 Rules are written to suit future needs of industry and all those concerned with global containerization.

Midboe, A (American Bureau of Shipping) *Container News* Vol. 9 No. 9, Sept. 1974, pp 10-12, Phots

PURCHASE FROM: Communication Channels, Incorporated 461 8th Avenue, New York, New York, 10001 Repr. PC

21 071836
"PIGGYBACK" TRANSPORT SPEEDS U.S. COTTON TO MILLS AND PORTS
Use of piggyback as a cost-saving transportation tool was considered by a seminar organized by the National Cotton Council. In the face of high global demand for U.S. cotton, as well as buoyant domestic markets, shippers have turned to intermodal service to improve the supply of materials. Basic to the success of this method of transport are a dependable reservoir of trailers and railroad flat cars, along with loading and unloading facilities at origin and destination. Although it may never be a replacement for boxcar and over-the-road trucking, piggyback can be a useful supplement in view of boxcar and fuel shortages.

Foreign Agriculture Vol. 12 No. 4, Jan. 1974, 1 P

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

21 071960
THE OPTIMUM NUMBER OF SIDINGS IN A MARSHALLING YARD
The waiting time conditions in a marshalling yard(consisting of a group of arrival sidings and a hump) have been investigated with the aid of methods developed earlier. It was found that, as the waiting times in the arrival sidings and their approach tend to compensate each other, there exists a minimum delay if the delay is regarded as the sum of the two waiting times. This also determines an optimum number of arrival sidings. Moreover, this method can be used for determining the maximum throughout capacity of marshalling yard. The application of the proposed method is facilitated by a number of diagrams.

Hein, O *Rail International* No. 6, June 1974, pp 414-422, 17 Fig., 2 Tab., 3 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

21 071978
OPTIMIZATION OF PROSPECTIVE PLANNING OF CLASSIFICATION YARD DEVELOPMENT
The paper deals with the solution of problems involved in determining the technical characteristics of classification yard operation relating the volume of car traffic to the car detention, and also to the allowable level of traffic to be handled by a yard, and in selecting measures for improving the technical equipment of a yard for the prospective conditions of its operation. The problems are solved with the use of the method of mathematical modeling of production processes on an electronic computer.

Sotnikov, EA *Rail International* No. 5, May 1974

ACKNOWLEDGMENT: EI (EIX740903048)
PURCHASE FROM: ESL Repr PC, Microfilm

21 072469
FREIGHT TRANSPORTATION IN BALTIMORE AND MARYLAND
Developments precipitated by the Northeastern railroad crisis have brought recognition that there is need for a rational national transportation policy. While the public has generally associated railroads with passenger service, and their proportion of total freight transportation has been declining for almost 50 years, railroads have been growing in terms of ton miles. A spectacular phase of rail transport has been the piggyback transport of trailers and containers. Some of the recent development of container service on the Western Maryland Railway is described. The importance of this type of international intermodal/service is discussed, along with other rail/marine traffic which moves through the port of Baltimore.

Leilich, GM (Western Maryland Railway Company) *Baltimore Engineer* Nov. 1974, 4 PP

PURCHASE FROM: Engineering Society of Baltimore, Incorporated 11 West Mount Vernon Place, Baltimore, Marylan 21201, Repr. PC

21 072576
COORDINATED RAIL TRUCK SERVICES: ENERGY USE AND CONSERVATION POTENTIAL
The author discusses ways that fuel might be saved by shifting toward less energy intensive modes of freight transportation. In comparing truck and rail, it is noted that there is not much difference between the two when pickup and delivery type operations are involved. Substantial opportunities for improved fuel economy do exist in linehaul operations where the railroads' fuel economy is undisputed. Examined are merchandise traffic, bulk materials and intermodal services. Greater use of piggyback, it is concluded, has to be the primary means of effecting a reduction in freight energy consumption.

Proceedings of the conference held at the University of Wisconsin, May 6-8, 1974, sponsored by the Federal Railroad Administration and the Wisconsin Department of Transportation contained in "The Role of U.S. Railroads in Meeting the Nation's Energy Requirements."

Morton, AL (Harvard University)
Wisconsin University, Madison Proc Paper Oct. 1974, pp 29-30

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Wisconsin University, Madison Graduate School of Business, Madison, Wisconsin, Repr. PC

21 072703
ACOUSTIC FLAW DETECTION IN RAILWAY WHEELS
Ultrasonic pulse propagation has been studied in quarter-scale model railway wheels. Surface waves traveling around the tread of a wheel have been used to detect simulated thermal cracks using both pulse echo and attenuation methods. Pulse echoes from simulated plate flaws have been found using a transducer positioned on the tread surface to produce Lamb waves in the plate. Plate flaws have also been detected from the differences in the audio frequency acoustic radiation spectra of good and defective quarter-scale models, using a real time analyzer. The extension of this work to full size wheels with actual defects is currently in progress.

Ultrason Int, Conf Proc, Imperial College, London, England, 27-29 March 1973.

Finch, RD (Houston University); Bray, DE
IPC Science and Technology Press Limited Conf Paper 1973, pp 194-198

ACKNOWLEDGMENT: EI (EI 74 065238)
PURCHASE FROM: ESL Repr. PC, Microfilm

21 072714
ECONOMICS OF SLURRY PIPELINE SYSTEMS
There has been a four-fold increase in town-mile capacity of slurry pipelines in the 1970s. This paper discusses the movement of those materials which have been proven technically and economically advantageous for long-distance pipeline handling. These materials are coal, iron concentrates, copper concentrates, and limestone. Phosphate is a potential commodity. The author cites 1.7 billion annual ton-miles of commercial experience. He notes that energy requirements are comparable to those of alternative modes. Coal transport costs by pipeline are below those for existing rail lines or waterways. Other minerals can be moved as slurries at costs below those for new rail lines.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Aude, TC Thompson, TL Wasp, EJ (Bechtel Corporation)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 194-202, 6 Ref.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

21 072726
FUTURE OF PIPELINE—BEYOND LIQUID AND GAS
Beyond the use of pipelines for fluid transport, technological development and social pressure are broadening the areas of potential use of this mode. The author notes that comprehensive transportation planning has almost completely ignored solids transport by pipeline. While the author admits that many of his proposals discount technical problems, he notes that it was not written as an exhaustive and authoritative document on solid pipelining. Instead, it is intended to spark an interest in this technology.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Zandi, I (Pennsylvania University, Philadelphia)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 187-193, 1 Fig., 5 Tab., 21 Ref.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

21 072819
CN TRUCKS PERFORM ON-THE-SPOT REPAIRS
The truck-mounted automotive equipment servicing workshop introduced by Canadian National can perform with all the versatility of a repair center. Mounted on a heavy-duty truck chassis, the car workshop is performing repairs on other CN trucks, as well as tractors, trailers, containers and container-handling equipment.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Railway Locomotives and Cars Vol. 145 No. 10, Oct. 1971, pp 20-21

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: XUM Repr. PC

21 072861
AUTOMATIC MEASURING OF WHEEL-TREAD INSIDE DIAMETER ON THE NC TURNING MILL [Automatisierung der Messung des Radreifen-Innendurchmessers an numerisch gesteuerter Karussell-Drehmaschine]
A friction-wheel diameter-measuring unit with digital indication is used for automatic and very exact measurement in conjunction with punched-tape controlled machining of the inside diameter of wheel treads on an NC turning mill. [German]

Heckner, J *Eisenbahntechnische Rundschau* Vol. 23 No. 10, Oct. 1974, pp 416-419, 4 Fig.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

21 072957
AN ANALYSIS OF THE WAGON COLLECTION PROCESS IN A MARSHALLING YARD
This paper analyses the arrival process of wagons in the sorting sidings of a marshalling yard. Based on this analysis a wagon collecting model is worked out, with fixed collecting periods for outgoing trains. The model makes it possible to relate the load factor of the outgoing trains to the time spent by the wagons in the sorting sidings, i.e. to determine the necessary technical parameters, as is demonstrated by examples. An alternative process of wagon collecting is also described, in which the standard maximum train load is strictly respected. The results of this method are investigated.

Kluvanek, P Brandalik, F *Rail International* No. 10, Oct. 1974, pp 652-673, 6 Fig., 8 Tab., 4 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

21 072963
THE LARGE MARSHALLING YARD OF THE FUTURE [La gare de triage a grand debit de l'avenir]
The authors have simulated shunting in a very well equipped marshalling-yard, and have established, by means of a computer, the points of separation of the routes followed by successive cuts. The variations in the length of the common section have enabled them to establish the backing speed which can be furnished by a programmer for the remote control of the hump locomotive. As the points of separation are situated at the level of the first marshalling points, the common sections are short, and the backing speeds can be higher than those practised in the past. A marshalling-yard of this description could deal with as many as 20,000 wagons per day. [French]

Grassmann, E Herbermann, N *International Railway Congress Assn Monthly Bull* Feb. 1969, pp 123-140, 6 Fig., 24 Ref.

ACKNOWLEDGMENT: AAR (411)
PURCHASE FROM: ESL Repr. PC, Microfilm

21 072968
KORIYAMA MARSHALLING YARD
The above article deals with the first automatic marshalling yard brought into operation in Japan, at the North junction in Tokyo. A description is given of this yard, whose 36 departure tracks are arranged in herring-bone fashion. It is equipped with 14 pneumatic retarders and 71 weight-operated retarders, of a new design, which are controlled by a computer operating in real time. Details are shown of the system of control, measurement, and regulation, of the speed, both of cuts of wagons, and hump locomotives.

Railway Gazette International No. 2, Jan. 1969, pp 54-56, 3 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: XUM Repr. PC

21 072970
OPERATIONS PLANNING EXPEDITES PC FREIGHT
Penn Central's Operations Planning Group has assumed a key role in high-level advance planning leading to the development of new terminal and operations procedures.

Roberts, R *Modern Railroads* Vol. 24 No. 10, Oct. 1969, pp 70-72, 1 Fig., 1 Phot.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: XUM Repr. PC

21 072971
PROBLEM-SOLVING IN THE TERMINALS
Three short articles on the subject of terminal congestion and how to improve procedures. One note deals with how cameras can improve yard layout.

Railway Age Vol. 166 No. 23, June 1969, pp 27-32, 3 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: XUM Repr. PC

21 072972
TOFC/COFC TERMINALS: KEY TO SERVICE AND GROWTH
The author shows that there has been a continuous increase in the traffic carried in road trailers (piggy-back services) and containers, by rail, in the United States, during the last ten years or more. The most important problem, so far as this traffic is concerned, is that of organising and equipping yards capable of keeping pace with this development. A description is given of different projects and achievements in this connection. The question is also dealt with of the large intercontinental bridge between Europe and Japan, in place of which preference would appear to be given to the "small bridge" linking different points on the Eastern Seabord and in the Western Centre of the United States.

Welty, G *Railway Age* May 1969, pp 21-25, 3 Fig.

ACKNOWLEDGMENT: AAR (1037)
PURCHASE FROM: XUM Repr. PC

21 072976
SIMULATION OF THE OPERATIONS IN A MARSHALLING YARD
When carrying out a study having as its object the optimum formation of through express—parcels trains, the Swiss Federal Railways decided to construct a simulation model, designed for the detailed examination of a part of the operations effected in a marshalling yard. This model, which was designed by Mr. Herren and Mr. Achermann, was programmed on a computer, and is described in the above article, dealing with Bienne Station, which receives and forwards 70 trains daily, and handles some 2,500 wagons.

Herren, H *International Railway Congress Assn Monthly Bull* No. 1, 1969, pp 17-33, 6 Fig., 3 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

21 072978
THE COMPUTER-CONTROLLED MARSHALLING YARD. BASIC FACTS. OBJECTIVES REACHED-OBJECTIVES AIMED AT SEELZE TRIAL
An important technical article dealing with the use of data processing by means of computers in order to simplify and accelerate the operation of marshalling yards in Germany. After having explained the problem, the author describes in detail the principles covering the application of the system, as in the case of an initial series of experiments carried out in Seelze marshalling yard. Based on the results obtained, he shows the data and the long term experimental programme which should enable these data-processing principles to be extended to include the operational management of a railway.

Bertrand, C *International Railway Congress Assn Monthly Bull* Oct. 1968, pp 341-372, 18 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

21 072981
REPORT OF STUDY ON WEIGHING OF FREIGHT CARS, SINGLE DRAFT, COUPLED-IN-MOTION, ON THE DULUTH, MISSABE AND IRON RANGE RAILWAY, ACI EQUIPPED, ELECTRONIC SCALE, AT PROCTER MINNESOTA
An account of experiments carried out with the object of determining the accuracy of measurements, and the behaviour, of a unit comprising an electronic scale and automatic wagon identification equipment.

Association of American Railroads Research Center Report ER-80, May 1968, 16 pp, 10 Fig., 3 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

21 072983
OVERSEAS RAILROADS TRY NEW YARD TECHNIQUES
Reviews how foreign (non-American) railways, faced with evergrowing competition, have produced new and different ways to classify cars quickly and efficiently.

Landow, HT *Modern Railroads* Vol. 23 No. 9, Sept. 1968, pp 94-100, 6 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: XUM Repr. PC

21 072984
DESCRIPTION OF AN ENGLISH HYDRAULICALLY OPERATED SYSTEM FOR CONTROLLING CAR MOVEMENTS IN CLASSIFICATION YARDS
The British Railways had experimented with a new retarder/booster system at their Tinsley Marshalling Yard from 1965-1967. The system employs some 23,500 hydraulic speed control units in the yard, some of which retard only, others of which can both accelerate and retard a car. The system is designed to correct car speed all the way to coupling, even allowing relatively high speeds through the switching area to increase car spacing. Performance of the system has been generally good, but has suffered the usual maintenance and design problems of a new system. During the testing period almost 100 hydraulic units per week had to be charged out.

AREA Bulletin Vol. 69 Bulletin 609, Nov. 1967, pp 158-166

ACKNOWLEDGMENT: AAR
PURCHASE FROM: ESL Repr. PC, Microfilm

21 072985
FEASIBILITY OF LINEAR MOTOR FOR CAR-RETARDER OR CAR-ACCELERATOR AT MARSHALLING YARDS
An account of experiments carried out by the J.N.R. in order to establish the possibility of using the linear motor as a retarder or booster of wagons in marshalling yards. The principle underlying the method consists in placing the linear-motor inductors on each side of the rail, the wagon-wheel rims forming the armature of the motor. By reversing the phases in the inductors, it is possible to reverse the direction of the tractive power, and, therefore, to obtain either a boosting or a retarding effect. A description is given of the design of the inductors, together with an account of the results of experiments.

Usami, Y Ishihara, M Kojima, N Mitomi, T *Railway Technical Research Institute* Quart. Rpt Vol. 9 No. 2, June 1968, pp 91-96, 15 Fig.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

21 072986
LINEAR-MOTORIZED CAR BOOSTER-RETARDER L4
Intended to contribute to automation of yard work on sorting tracks, this system catches automatically freight cars, which run into sorting tracks at widely varying speeds, boosts, retards, releases them at a safe coupling speed or stops them. It is program-controlled or remote-controlled by radio.

Railway Technical Research Institute Quart. Rpt Vol. 10 No. 4, Dec. 1969

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

21 072987
REPORT OF STUDY ON WEIGHING OF FREIGHT CARS, SINGLE AXLE, COUPLED-IN-MOTION ON THE SPOKANE, PORTLAND AND SEATTLE RAILWAY ELECTRONIC SCALE AT VANCOUVER, WASHINGTON
An account of an extensive series of experiments undertaken for the purpose of ascertaining the saving in time made possible by the use of an electronic scale enabling moving wagons to be weighed, without having to be uncoupled, as well as the accuracy of this system of weighing, as compared with separate static weighing. A description is given of the experimental equipment, as well as of the method used, together with a detailed analysis of the results.

Association of American Railroads Research Center Report ER-85, Oct. 1968, 21 pp, 9 Fig.

ACKNOWLEDGMENT: AAR (293)
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

21 072989
HOW TO MARSHALL FREIGHT CONTAINERS
A study of the many problems posed by the increase in container traffic: storage space at the transhipment depots, equipment for handling the containers when transferring them from one means of transport to another, or stacking them. A description is given of a whole series of specialised equipment.

Hardie, C *Engineering* June 1968, pp 923-929, 22 Fig.

ACKNOWLEDGMENT: AAR (1045)
PURCHASE FROM: IPC Industrial Press Limited 33-39 Bowling Green Lane, London EC1P 1AH, England Repr. PC

21 072990
CONTRIBUTION TOWARDS THE DETERMINATION OF THE NUMBER OF TRACKS IN SETS OF THROUGH LINES [Beitrag zur Ermittlung de Gleiszahl in Zugfahrgleisgruppen]
In the case of practical railway operating, the intervals between trains arriving on sets of tracks in a station frequently show a slighter difference in time than could have been expected from their negative exponential distribution. The distribution of intervals between trains can then be restored by means of the necessary subaccidental distribution. To cover operating condition of this type, a theory is advanced, by means of which a theoretically probable description of sub-accidental arrival and completion operations, and the calculation of the necessary number of tracks, is possible, whilst taking pre-established statistical safety figures into account. The traffic density which is necessary for the practical measurement of sets of tracks, and which constitutes a maximum value, is set out in tables covering statistical safety figures of 99 and 95 % and calculated values of 1 to 5. At the end of the theoretical part of the work three examples of calculations are shown "to illustrate praticable applicability". [German]

Voight, W *Hochschule f Verkehrs F List Wissenschaft Zeitschr* 1969, pp 429-436, 5 Fig., 3 Tab., 10 Ref.

ACKNOWLEDGMENT: AAR (896)
PURCHASE FROM: ESL Repr. PC, Microfilm

21 080086
ON THE TEST OF A DEVICE FOR THE MEASUREMENT OF STATIC IMBALANCE OF WHEEL LOAD AS A PART OF AUTOMATED ARRIVAL INSPECTION SYSTEM IN FREIGHT CAR YARD
Described is a method for detecting the variation in wheel loads on cars moving into a yard at speeds higher than the regular weighing-in-motion scales used on the Japanese National Railways. The on-line system is aimed at being a part of an inspection station where hot boxes and worn wheels would also be measured automatically. The results with this automatic freight car inspection system are to be collated in a process computer.

Shioya, A Nakamura, M Shimada, S Wada, K Yamazaki, S *Railway Technical Research Institute* Quart Rpt. Vol. 15 No. 3, Sept. 1974, pp 170-171, 4 Fig., 1 Tab.

ACKNOWLEDGMENT: Railway Technical Research Institute
PURCHASE FROM: Ken-yusha 1-45-6, Hikari-cho, Kokubunji, Tokyo, Japan Repr. PC

21 080125
TESTS ON HIGH TENSILE BANDING TO DETERMINE EFFECT OF RADIUS AT POINT OF SECUREMENT
This report covers tests requested by the AAR Mechanical Division Committee on Loading Rules to study the radius at point of securement for steel strapping. Where high tension bands are used for hold down securement, the bands may be secured to the car in several different ways. The most common are through the stake pockets or to specially provided anchor pockets. Where these methods are not provided, or the load is of such design as to make these securement facilities impractical, steel bars or rods or steel bolts may be attached to the car to provide anchorage for the high tension bands. Whichever type of securement is used, Rule 16, of Section 1, of the General Rules covering the loading of Commodities on Open Top Cars, specifies that points where the bands contact the securement pocket must be rounded off or provided with metal fillers to protect the bands. To determine a minimum allowable radius they requested static and dynamic tests on radii up to 1/2 in. In the event of load shift the hold down strap will shift and the strap will be at some angle other than 90 degrees to the edge of the stake pocket or whatever securement was provided. This change in the strap angle will result in the strap being loaded at one edge. To investigate this condition the committee requested static and dynamic tests with the strap at an angle of 15 degrees as well as for a straight pull. The results of tests at a radius and angle where there were no failures at the radius of curvature were averaged. This average represents 100 percent of the strap capacity. Those tests at radii and angles where failure occurred at the radius of curvature are listed as the percent of the strap capacity for the five tests at the particular radius and angle.

Association of American Railroads Research Center, (69-M-36) R-103, Feb. 1971, 8 pp, 2 Fig., 2 Tab.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

21 080244
STUDY OF THE ECONOMICS OF SHORT TRAINS
The study examines various operating and economic aspects of short train operation. It includes a summary of studies conducted by several railroads plus original research by the author. Changes in freight train labor productivity and costs are discussed and related to changes in capital invested in freight cars. Parameters relevant to train size include identified operating, economic and marketing factors. Since no comprehensive analytical procedures exist upon which to formulate conclusive answers, the study documents the need for the railroad industry to develop such a methodology.

Leilich, RH
Peat, Marwick, Mitchell and Company June 1974, 39 pp, 13 Fig., 2 Tab., 3 App.

ACKNOWLEDGMENT: NTIS (PB-235411/6)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235411/6, DOTL NTIS

21 080309
INCREASING TRAFFIC CAPACITY ON THE REGENSBURG-INGOLSTADT OIL RAILWAY [Ausbau der Olbahn Regensburg-Ingolstadt]
All of the facilities of the single-track line between Ingolstadt and Regensburg have had to be modernized and improved to meet the needs of new refineries and other large industrial works in the area. A step-by-step balance between traffic demand and line capacity has resulted. The author

describes the operational requirements and the various construction phases in the overall plan. [German]

Maak, H *Eisenbahntechnische Rundschau* Vol. 23 No. 1, Nov. 1974, pp 446-456, 10 Fig., 4 Tab., 6 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

21 080317
STABILITY OF LARGE CONTAINERS EXPOSED TO STRONG SIDE WINDS. SECURING OF LARGE CONTAINERS ON CARRYING WAGONS
In the case of very strong side winds, empty large containers (Sea-Land and 40-ft types) are in danger of overturning because of their large wall areas together with a relatively low specific mass. After 12 large containers blew off vehicles in 1970, the ORE B 112 Committee felt it necessary to insure the safety of rail traffic by thoroughly examining the stability of containers in strong side winds. After theoretical calculations, it was concluded that winds in central Europe are not so high as to require the container be secured to the car underframe. However, the design of vertically retractable pins, the future standard, is capable of retaining containers on cars in areas such as coastal regions where high winds can occur. The tests are described.

Rail International No. 11, Nov. 1974, pp 731-735, 2 Fig.

PURCHASE FROM: ESL Repr. PC, Microfilm

21 080651
INTERACTION BETWEEN VARIOUS TYPES OF TRANSPORTATION
Problems examined included interaction between various types of transportation and the development of container transportation in the USSR and abroad. The collection is intended for the scientific, technical and engineering personnel engaged in all types of transportation, as well as for instructors, students and graduate students.

Trans. of unidentified Russian Language mono., pub. by Vsesoyuznyi Institut Nauchnoi i Tekhnicheskoi Informatsii, Moscow, 1971 104p.

Osipov, VT
Army Foreign Science and Technology Center FSTC-HT-23-1136-73, Nov. 1973, 106 pp

ACKNOWLEDGMENT: NTIS (AD/A-001385/4ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD/A-001385/4ST, DOTL NTIS

21 080769
WANTED: A TOTAL COMMITMENT
A series of three articles describe the trends and developments in railway trailer and container service. New mechanized terminals are being built to increase the efficiency of the operation. The Family Line System has one of the most aggressive flatback programs in the United States, Southern Railway is rapidly converting from container operations to trailers because they are more economical to operate.

Modern Railroads Vol. 29 No. 11, Nov. 1974, pp 54-60

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

21 080770
WHICH TRUCKERS COMPETE WITH US?
Owner-operator truckers are the most serious truck competition to railways. They tend to compete for the same class of freight and are not likely to use intercity flatback service. On the other hand, the regulated motor common carrier is only nominally a flatback customer.

Modern Railroads Vol. 29 No. 11, Nov. 1974, pp 65-67

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

21 080771
SPECIAL TASK FORCE RESEARCHES TERMINALS
It has long been realized that terminals, rather than being part of the solution, have become a major portion of the problem in providing good service to shippers. Early in 1970 a task force was created to identify the major problem areas of terminal activity and to recommend solutions. The study of the Missouri Pacific's St. Louis Terminal is discussed in this article.

Progressive Railroading Vol. 17 No. 8, Aug. 1974, pp 36-37

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

21 080774
IN-MOTION WEIGHING EXPANDS
In-motion weighing scales are being used to improve overall freight performance on certain types of service. These scales are particularly useful at classification yards and weighing unit trains where car movement is at a premium for efficient performance. The article provides a brief history of the development of in-motion weighing and discusses the problems of developing tolerances for the scales.

Progressive Railroading Vol. 17 No. 8, Aug. 1974, pp 30-31

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

21 080880
ST. LOUIS: TERMINAL EFFICIENCY IS NO "IMPOSSIBLE DREAM"
As one phase of the Labor/Management Executive Committee activity established with DOT/FRA participation in 1970, a Terminal Task Force was organized to look at a number of situations where traffic was being delayed because of poor operating practices, work-rule restrictions and government restrictions. Starting in 1973, Missouri Pacific's St. Louis Terminal became one of the sites for experimentation. Funding of the project is by Labor, AAR, FRA, and MP. Two experiments involving car movements are under way, a third experiment not involving car movement is in progress and six more phases are being developed.

Railway Age Vol. 175 No. 14, July 1974, 3 pp

PURCHASE FROM: XUM Repr. PC

21 080881
FOR READING, NO "BANKRUPTCY" IN L&D PERFORMANCE
The Reading Railroad has an organized approach to controlling loss and damage payouts which has seen their relation to gross freight revenues decline appreciably over the past decade. A two-man L&D prevention group works steadily with the railroad's approximately 6,850 online customers on proper loading and blocking techniques and on destination inspections to pinpoint problems. The prevention activity has support of top management and this is made known down throughout the supervisory and contract ranks.

Welty, G *Railway Age* Vol. 175 No. 14, July 1974, 4 pp

PURCHASE FROM: XUM Repr. PC

21 081253
A SET OF METHODS FOR THE CHOICE OF THE OPTIMAL SOLUTIONS FOR INCREASING THE TRANSPORT CAPACITY AND THE TRAFFIC DENSITY ON THE LINES OF A RAILWAY NETWORK [Metodika za izbor na optimalna etapnost pri uvelicivanie prevoznata i propuscatelnata sposobnost ucasttite v zp. mreza]
This set of methods resolves the complex problem of choosing the optimal solutions for increasing the transport capacity and the volume of traffic on the lines of a railway network in a given period of time. The aspects examined in the study are: (1) the change in the volume of traffic in the period under consideration; (2) the various solutions for increasing transport capacity and line density in stages; and (3) operating characteristics

and existing technical equipment on the railway network lines. The aim of this set of methods is to determine: (1) the order, as well as the optimal time limits, in which measures for increasing transport capacity and line density should be carried out; (2) the characteristics of the optimal variables and near-optimal variables. The article deals with 4 complex measures for increasing transport capacity and line density: (1) changing the gross tonnage of trains; (2) the introduction of the automatic block system and a change in operating methods; (3) doubling the track partially along lines; and (4) doubling the track entirely along lines. The criterion for choosing a solution is based on the comparison between the investments required for carrying out the operations and the extent to which line capacity and the volume of traffic will be increased. [Bulgarian]

Annual Publication of The Research Centre for Cybernetics in Transportation and the Complex Problems Related to Transport.

Nikolov, G
Research Centre for Cybernetics Vol. 1 1973, pp 29-62, 18 Ref.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 1086)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

21 081392
METHODOLOGY FOR INVESTIGATING THE POSSIBILITIES OF FORMING MULTI-GROUP GOODS TRAINS DURING THE FIRST SORTING PHASE AT HIGH-CAPACITY MARSHALLING YARDS

In railway goods traffic, the standard of service is decisively influenced by the total travelling time of the payload. That is why, from the outset, it has been the aim of marshalling techniques to reduce the time required for the forming and reclassifying of the trains. By integrating the secondary sorting process with the train splitting process at the main hump, the formation of multi-group trains can be considerably accelerated. With the secondary sorting method, here investigated irrespective of local conditions at any given marshalling yard, it is possible to derive considerable benefits from automatic train splitting operation also in respect of the formation of multi-group trains and to achieve a streamlined marshalling process. The paper sets out to prove the feasibility of humping single wagons as well as rakes of wagons and to indicate the practical limits of the proposed optimum concept for the control of the marshalling equipment. A method suggested in the paper can be used for calculating the necessary number and length of the sidings. Apart from permitting the calculation of the time required for the marshalling operations, the method provides a basis for the economic comparison of the suggested "formation of multi-group trains during the first sorting phase" with other secondary sorting systems. The paper is a synopsis of the key results of a dissertation with the same title, published in 1974 as No. 6 of the series of publications of the "Institute for Transport, Railway Matters and Traffic Protection" at Brunswick Technical University.

Boebertshahn, R *Rail International* No. 12, Dec. 1974, pp 754-766, 8 Fig., 12 Ref.

ACKNOWLEDGMENT: Rail International
PURCHASE FROM: ESL Repr. PC, Microfilm

21 081631
INTERCITY FREIGHT MOVEMENT BY RAIL AND HIGHWAY

The four authors examine various aspects of rail freight service, especially in comparison to movement by truck. Morton examines the changing markets that characterize the American economy and their effects on rail freight transportation. Deboer looks at ways in which railroads might improve service and capital utilization without increasing long-run total costs. Blaze examines the rail plant and traffic trends in city areas, using the Chicago region as a case study. Fuller discusses the abandonment of railroad lines from the standpoint of state government, suggesting a role for states in analyzing both major and and minor abandonment proposals.

This publication is complied of 4 reports prepared for the 53rd Annual Meeting of the Highway Research Board.

Transportation Research Record No. 511, 1974, 44 pp, Refs., 1 App.

PURCHASE FROM: TRB Repr. PC

21 081635
RAIL AND RAIL-TRUCK TERMINALS: AN OPPORTUNITY IN URBAN TRANSPORTATION PLANNING

This paper examines the rail plant and traffic trends in city areas. The 4,800-square mile Chicago region is used as a case study for railroads in urban markets. The location of railroad piggyback facilities is the principal topic covered since it is the author's hypothesis that the modernization of urban railplant can best be planned by the conscious implementation of stronger intermodal rail services and government policies toward such services.

This is one of four articles contained in the TRB publication "Intercity Freight Movement by Rail and Highway", RRIS #081631.

Blaze, JR (Chicago Area Transportation Study) *Transportation Research Record* No. 511, 1974, pp 20-28, 3 Fig., 1 Tab., 9 Ref.

PURCHASE FROM: TRB Repr. PC

21 081946
EVALUATION OF THREE DEVICES TO SECURE INTERMODAL CONTAINERS TO FLAT-BED TRAILERS

Three different securement devices have been tested to determine whether they meet Department of Transportation safety and strength requirements for attaching intermodal containers to regular flat-bed trailers. The tests consisted of a series of static loads applied to simulate the hazards of transportation. Each of the three devices passed all tests and it is concluded that the designs are satisfactory and that they may be used for over-the-road transport of ammunition. (Author)

Trowbridge, WH
Naval Weapons Handling Laboratory NWHL-7428, Sept. 1974, 12 pp

ACKNOWLEDGMENT: NTIS (AD-786377/2SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-786377/2SL, DOTL NTIS

21 082173
A STUDY OF THE ECONOMIC INFLUENCE OF CONTAINERIZATION ON TRANSPORT SYSTEMS

This report of the 21st Round Table on Transport Economics by the European Conference of Ministers of Transport examines why the "container revolution' has progressed at a pace far slower than expected, both in maritime operations and in the inland operations of the railways. While it is directed primarily at inland movements, both phases must be considered. While the containers is no universal panacea, the Round Table points out it offers new opportunities and can be applied successfully with strict managerial concentration on marketing, tight control of performance, and effective asset management. Internal and international containerization need government support intially to assure collaboration of all the participants and to provide an ongoing atmosphere of international economic cooperation.

European Conference of Ministers of Transport #22, 1974, 77 pp

PURCHASE FROM: Organization for Economic Cooperation and Devel Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006 Repr. PC

22 057707
COSTPRO: CAN IT OVERCOME CUSTOM'S PAPER WORK DICTATORSHIP?
A joint association between the Canadian Government and several Canadian industries was created in 1972 to develop a computer based system that will eliminate most of the paperwork, and thus speed up the operations, of the customs procedures in Canada. The system, known as "The Canadian Organization for the Simplification of Trade Procedures" (COSTPRO), was first proposed in 1969. The Organization has kept in touch with other similar systems being developed in other countries, noteably England, and hopes that ultimately a COSTPRO type system might be used globally.

Patterson, M *Canadian Transportation & Distribution Management* Vol. 77 No. 5, May 1974, pp 14-17

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Southam Business Publications Limited 1450 Don Mills Road, Don Mills M3B 2x7, Ontario, Canada Repr. PC

22 071616
FAST RAIL LOADOUT SPEEDS GEORGIA PLANT OPERATIONS
High production and fast rail car loadout are the main features of Vulcan Materials Company's new Stockbridge, Ga., crushed stone plant. Rated at a design capacity of 1500 tph, the plant can load a 50-car unit train in two hours, or approximately two minutes for each 100-ton car.

Robertson, JL *Rock Products* Vol. 77 No. 8, Aug. 1974, pp 40-44

PURCHASE FROM: University Microfilms 313 North First Street, Ann Arbor, Michigan, 48103 Repr. PC

22 071624
MOVING BEYOND THE PHYSICAL DISTRIBUTION ORGANIZATION
Strict movement of goods, once considered the proper transportation perspective for the transportation professional in a shipping firm, has been supplanted by the concept of physical distribution which changes the outlook from solely rates to total distribution cost and examination of tradeoffs between transportation and other functions. This paper traces the change in corporate transportation thinking and proposes a further refinement known as the logistics system concept, a logical evolutionary process according to the authors. Such problems are so broad that any one department is limited in scope to handle them.

DeHayes, DW, Jr (Indiana University, Bloomington); Taylor, RL (United States Air Force Academy) *Transportation Journal* Vol. 13 No. 3, Apr. 1974, pp 30-41

PURCHASE FROM: XUM Repr. PC

22 071752
URBAN GOODS MOVEMENT
A wide range of topics involving the broad field of urban goods movement is covered in this series of 12 papers. The role of trucking is undisputed and various facets of the local distribution problem are examined. Included are demand for urban goods movement, desirability of terminal consolidations, the volume of vehicles and their emission production, the location of distribution centers, and identification of the data needed for urban goods transportation analysis.
Twelve reports prepared for the 52nd and 53rd Annual meeting of the Highway Research Board. This also available from NTIS, PB-235948/7ST, pricing is PC $5.25 and Microfiche $2.25.

Transportation Research Record Vol. N No. 96, 1974, 114 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Repr. PC

22 071844
STUDY OF LEVELS OF PACKAGING/PACKING OF CONTAINERIZED AMMUNITION
The study required a detailed review of the present ammunition logistics system and a visualization of the system as it would be with maximum use of containers. Natural and induced environments throughout the system were evaluated. Previous studies were reviewed and available data evaluated, including results of studies and tests of other type containers, shelters, and vehicles. User representatives of combat, combat support and combat service support organizations provided information used to assess the impact on missions at the organizational, direct support and general support levels, including supply, maintenance, surveillance, equipment changes, and safety. (Author)

McGaughy, RV
Picatinny Arsenal Tech. Rpt. PA-TR-4669, June 1974, 53p

ACKNOWLEDGMENT: NTIS (AD-783495/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-783795/5, DOTL NTIS

22 072465
RAILROAD ESCORT RIDERS, A "SPECIAL INTEREST," NON-CARRIER ACCESSORIAL SERVICE
Shippers of large and heavy products have been forced to evaluate the net effects of product distribution against the total economic considerations that are associated with the end use of their products. The demand for independent carload escort service has increased in direct proportion to the declining financial position of the eastern railroads and the increasing size and weight of individual items being tendered to the carriers for transit. The independent "for hire" escort rider has satisfied the need for personalized, non-affiliated representation during transit and delivery of priority rail shipments. This paper evaluates the functions and responsibilities of the various forms of this non-carrier accessorial service.

Roy, RN (Stone and Webster Engineering Corporation) *Transportation Journal* Vol. 14 No. 1, Sept. 1974, pp 25-29

PURCHASE FROM: XUM Repr. PC

22 072467
THE TOTAL COST VS. TOTAL PROFIT APPROACH TO LOGISTICS DESIGN
From the inception of the physical distribution concept in the 1950s when it was regarded as a passive back-up function for cost control, logistics systems are now viewed by management as powerful competitive tools for increasing customer demand and satisfaction. With few exceptions, it is claimed that the Total Cost Approach is outmoded for designing modern consumer-oriented logistics systems. This paper advocates a shift in emphasis from the Total Cost Approach under certainty to a Total Profit Approach under conditions of risk. It reflects the belief that management operates within a risk environment where Physical Distribution Management might better be identifed as Profitable Distribution Management.

Poist, RF (Maryland University, College Park) *Transportation Journal* Vol. 14 No. 1, Sept. 1974, pp 13-24, 5 Tab., Refs.

PURCHASE FROM: XUM Repr. PC

22 072481
MOVING BEYOND THE PHYSICAL DISTRIBUTION ORGANIZATION
In a functional organization, the traffic manager is concerned mainly with the movement of materials to and from processing operations. Traffic management is evaluated on how efficiently the pure movement function is operated. The transition to a physical distribution department has been varied in different organizations but the pace has usually been slow. The transportation perspective has moved from an independent, autonomous activity to a concept of physical distribution management. The authors see the next stage as a change to a logistics system concept.

DeHayes, DW, Jr (Indiana University, Bloomington); Taylor, RL (United States Air Force Academy) *Transportation Journal* Vol. 13 No. 3, Mar. 1974, pp 30-41

PURCHASE FROM: XUM Repr. PC

22 072722
ECONOMIC EFFICIENCY OF MEAT AND LIVESTOCK TRUCKING FIRMS
This study was designed to measure costs of long-distance shipment of meat by motor carrier, comparing them against published rates for truck, rail and piggyback. Meat trucking costs were also compared with the costs of shipping meat-equivalent amounts of livestock. The authors observe that meat shippers are largely dependent on truck transportation, owing to its service advantages. There is the potential competition from rail and

piggyback operations. A reduction in regulation of common carrier truckers might remove some of the advantage of the private carriers. It was concluded that competition in the absence of regulation would not be disorderly.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Anderson, DG Budt, WW (Nebraska University, Lincoln)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 443-451, 2 Fig., 7 Tab.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

22 080245
STANDARD TRANSPORTATION COMMODITY DESCRIPTION AND CODE SYSTEM. SUPPLEMENT TO PHASE IV REPORT
This is a supplement to the fourth and final report on Commodity Descriptions and Coding provided to the Department of Transportation by the Transportation Data Coordinating Committee. The supplement completes the Brussels Nomenclature/Standard International Trade Classification (BTN/SITC) harmonization for all the industries contained in the Standard Transportation Commodity Code manual.

See also Phase 4 report, PB-233 985.

Desnoyers, TH Forrest, GM Guilbert, EA
Transportation Data Coordinating Committee, Department of Transportation Report TDCC-74-104A, July 1974, 201 pp

Contract DOT-OS-10205

ACKNOWLEDGMENT: NTIS (PB-235242/5ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235242/5ST, DOTL NTIS

22 080247
FACTORS AFFECTING CARGO LIABILITY PROBLEMS IN URBAN GOODS MOVEMENT AND PROPOSED SOLUTIONS
The report explores the liability problems associated with the intermodal movement of goods into, out of, and through urban areas. It focuses on loss, damage, delay of shipments, and stresses the susceptibility of small shipments to loss, damage and delay. The relationship of liability to the urban area is particularly strong since approximately 85 percent of the loss and damage occurs at the interfacing terminals in the urban area. The inadequacies of present recovery practices and procedures are discussed, as well as the need for uniform standards of liability for intermodal cargo shipments.

Kenkel, JJ
Consortium of Universities, Urban Mass Transportation Administration Res. Rpt. UTC-74-03, May 1974, 93 pp

Contract DOT-UT-394

ACKNOWLEDGMENT: NTIS (PB-235671/5ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235671/5ST, DOTL NTIS

22 080763
CLEARING THE FREIGHT RATE JUNGLE
The vast volume of freight rates used today makes a confusing, if not impossible, task for a shipper to plan his business. In addition, there is an immense amount of routine paper work that must be handled with each shipment. To attempt to reduce the number of rates and the amount of paper work, the Transportation Data Coordinating Committee was established in 1968. This organization is developing a standard system of commodity, carrier, geographic and customer coding that can be used in a computer system. In addition, the TDCC is working on a simplified waybill-less tariff procedure and shipper- carrier data interchange system.

Modern Railroads Vol. 29 No. 9, Sept. 1974, pp 80-83

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

22 080787
CRUSTING AGENT MINIMIZES LOSS OF COAL IN TRANSIT
A latex binder material sprayed on the tops of loads of coal serves to stabilize the lading so that there will be no loss in the slip stream that develops above moving trains. Youngstown Sheet & Tube has adopted this method of protecting against lading loss from unit trains moving from southern West Virginia to northern Indiana. Other railroads have looked at the method which can serve to raise speed limits of some coal trains. The tests conducted prior to adopting the latex spray system are described.

Railway Age Vol. 175 No. 17, Sept. 1974, pp 58-59, 2 Phot.

PURCHASE FROM: XUM Repr. PC

23 052567
PRACTICAL MEASURES TO BE TAKEN TO MAINTAIN TIMEKEEPING IN THE EVENT OF OPERATING INCIDENTS
On most railways supervision of train running is the responsibility (for a given geographical sector) of a controlling body to which all the stations in the sector are connected. In the event of an accident or an incident, this body takes the necessary measures in conjunction with the stations concerned to maintain the running of trains in the event of an interruption on one or more tracks and to restore the situation to normal as quickly as possible. It also gives the stations concerned, and, where applicable, the control bodies of other sectors and services involved, also possibly a central control body, quick information on the immediate foreseable operating consequences of the incident; delays and cancellations of trains, diversions, transhipments, substitute methods of transport put into effect, etc. This document sets out the results of the investigation undertaken among certain UIC railways (SNCF, BR, CFF, DB, DSB, FS, NS, OBB, PKP, RENFE, SJ, SNCB).

International Union of Railways 30, Jan. 1972, 14 pp, 1 App.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

23 057345
SOME EXAMPLES OF UNDERGROUND DEVELOPMENT IN EUROPE
This report describes six developments where considerable use has been made of the underground to provide transport facilities. Three are part of the planned transport network for Brussels, two are multi-modal interchanges at the middle of Essen and the La Defense development near Paris and the last is an underground road junction in Rome. The schemes show how the underground can be used in solving central urban transport problems.

O'Reilly, MP
Transport and Road Research Laboratory TRRL-LR-592, 1974, 35p

ACKNOWLEDGMENT: NTIS (PB-231959/8)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-231959/8, DOTL NTIS

23 057347
U.S. AND CANADIAN URBAN MASS TRANSPORTATION SYSTEMS
The purpose of this study was to investigate U.S. and Canadian transit systems on a comparative basis. It was proposed that this investigation be confined to the study of three conceptual variables of organizational structure and personnel profiles, personnel process, and marketing strategies. The basic objective of the study was to provide knowledge that would be of use in establishing and implementing policies concerning the basis or rationale for investment in the development of U.S. transit personnel and the marketing of transit services. A major problem of those wishing to recommend investment in the development of human resources is the demonstration of tangible results. It is the authors belief that internal development of U.S. transit personnel and their policies is the most expedient route to revitalizing public transit in U.S. cities. The quality of individuals who serve in transit's managerial, technical, and supervisory positions is a leading (if not single-most important) determinant of the extent to which mass transit will be improved.

Mundy, RA
Pennsylvania State University, University Park, (UMTA-PA-11-0010) TTSC-7401, Jan. 1974, 158p

ACKNOWLEDGMENT: NTIS (PB-232590/0)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232590/0, DOTL NTIS

23 057350
PLANNING MODE SELECTION AND ECONOMIC FEASIBILITY REPORT CHARLOTTE-HENRIETTA TRANSIT CORRIDOR, VOLUME I. PLANNING AND PRELIMINARY MODE SELECTION
The purpose of the report is to provide the necessary documentation by which an evaluation may be made of the economic and technical feasibility of the proposed Charlotte-Henrietta Rapid Transit System in Rochester, New York. Presented are an analysis of present conditions, the determination of future transit requirements and an initial analysis of alternative transportation systems. Requirements for rapid transit are based on population projections, employment projections, existing land use, proposed land use plans, patronage projections and resultant service characteristics. The three alternative rapid transit modes which best satisfy all of the criteria established for Rochester were the grade separated conventional rail, light rail and busway system.

Prepared by Corddry, Carpenter, Dietz, and Zack Engineers, Rochester, N.Y.

Rochester-Gennessee Regional Transportation Auth, (UMTA-NY-09-0006) Tech Study Feb. 1974, 322p

ACKNOWLEDGMENT: NTIS (PB-232347/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232347/5, DOTL NTIS

23 057431
ELECTRO-ACOUSTICAL EQUIPMENT FOR THE TRAINS AND STATIONS OF THE MUNICH UNDERGROUND
[Beschallungsanlagen fuer die Zuege und die Bahnhoefe der Muenchener U-Bahn]
Siemens has supplied and, to a large extent, also installed the electro-acoustical equipment for the trains and the 17 stations of the first section of the Munich Underground. The train equipment includes loudspeakers for internal and external announcements. The excellent quality attainable by the system is exemplified by graphs of the sound distribution in the interior of the train and on the platforms and by frequency analyses of the loudspeaker transmissions in relationship to the existing background noise. [German]

Bauersachs, R Gerland, H *Siemens Review* Vol. 48 No. 1, Jan. 1974

ACKNOWLEDGMENT: EI (EI 74 601949)
PURCHASE FROM: ESL Repr PC, Microfilm

23 057440
FINNISH RAILROADS AND PUBLIC TRANSPORT IN HELSINKI
[Le ferrovie finlandesi ed i transporti pubblici di Helsinki]
Recently, the Finnish railways started the electrification of some lines starting from Helsinki, on which there is an intense suburban traffic. One of the main reasons which induced the VR to make this decision was that of limiting the importance of fuels of foreign origin and to make a better use of national power resources deriving from the possibility of exploiting, with hydroelectric power stations, the numerous lakes and rivers which cover about a tenth of the area of the country. In the Helsinki Region, for essential connections not served by VR suburban lines, two metropolitan lines will be constructed, with advanced characteristics, on which the use is envisaged of trains with automatic drive. The street car network of Helsinki, made up of 9 lines, will be maintained and modernized with the introduction, among other things, of 40 modern articulated cars equipped with static speed regulation. Details of the the Finnish RR development program are given. [Italian]

Marini, R Ziccardi, G *Ingegneria Ferroviaria* Vol. 29 No. 1, Jan. 1974, pp 21-33, 13 Ref.

ACKNOWLEDGMENT: EI (EI 74 605344)
PURCHASE FROM: ESL Repr PC, Microfilm

23 057457
TENDENCIES IN THE FURTHER DEVELOPMENT OF THE ROLLING STOCK OF THE GERMAN FEDERAL RAILWAY
[Tendenzen fur die Weiterentwicklung des Fahrzeugparks der Deutschen Bundesbahn]
The increasing volume of traffic, steadily higher speeds and the users' demands for a still better service are making themselves felt in the development of new traction and rolling stock. In the article the Author shows by way of examples the nature of the German Federal Railway's response to meet the changing situation. [German]

Leibl, W (German Federal Railway) *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 7-13, Figs., Phots.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

23 057485
MUNI: THE SECOND SYSTEM
The San Francisco Municipal Railway is the second heaviest public transportation carrier in the United States after the New York system. The system is presently undergoing a $205 million renewal program that will give San Francisco the most modern light rail system outside of Europe as well as a new fleet of trolley coaches and diesel buses.

Myers, ET *Modern Railroads* Vol. 29 No. 6, June 1974, pp 60-62

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

23 057504
PICC-VIC: ON, OFF, NOW ON AGAIN—OR IS IT?
The 19th century bequeathed the Greater Manchester area the biggest railway network outside London. Unfortunately the network was—and still is—divided. The former Lancashire and Yorkshire Railway Company built most of the northern network based on Victoria Station. The London and North Western Company built most of the southern network. The two halves are still run separately. The Picc-Vic project is quite simply planned to bridge that gap. And until last August the scheme was moving forward steadily on the basis of detailed costing and survey work following an agreed transportation strategy for the Greater Manchester area.

Surveyor-Public Authority Technology Vol. 143 No. 4278, June 1974, 6 pp, Phots.

ACKNOWLEDGMENT: Surveyor-Public Authority Technology
PURCHASE FROM: IPC Building and Contract Limited 32 Southwark Bridge, London SE1, England Repr. PC

23 057509
UNDERGROUND RAILWAYS OF THE WORLD
The story of the underground railway system is the story of the growth of the modern city. The tremendous upsurge in trade and communications, which began in Victorian times, led to a situation where the main line railway stations of our cities rapidly became isolated from the centres of business, and the idea of small linking railways between terminals came into being. The first part of Mr. Nock's book deals with general principles and concentrates on the development of the underground railway in London, but as the title of the book suggests, it goes on to include systems from all over the world—the Paris Metro, the New York system, the Madrid Metro, the Moscow Metro, the San Francisco system, the Canadian subways and European development in general. Signalling, automation and such fascinating and little-known sidelights as a Post Office Tube system are also fully covered.

Nock, OS
Saint Martin's Press, Incorporation 1973, 288 pp, Figs., Phots.

ACKNOWLEDGMENT: Saint Martin's Press, Incorporation
PURCHASE FROM: Saint Martin's Press, Incorporation 175 Fifth Avenue, New York, New York, 10010 Orig. PC

23 057521
RAPID TRANSIT TO EASE CALCUTTA'S CONGESTION
Work is now under way on a 16-km underground line along the most severely congested corridor in Calcutta. Scheduled to open in 1979, the line is being constructed largely by cut-and-cover through difficult subsoil conditions in one of the most densely populated urban areas in the world.

Mukherjee, SS (Metropolitan Transport Project (Railways)) *Railway Gazette International* Vol. 130 No. 6, June 1974, pp 232-235, 2 Phot.

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: XUM Repr. PC

23 057524
HANDBOOK ON URBAN PLANNING
Urban planning is one of the most pressing subjects of the times with the majority of the people living in urban areas in North America and Europe and those areas continuously growing. The motivation of the authors also includes their desire to place in the hands of planners (professional and lay) a positive and useful book (a) to offset the dire predictions of the future, so in vogue, with principles, methods, and standards of planning that will ensure a hopeful instead of a hopeless future, (b) to recognize the order and abundance that exists and to capitalize on them for the benefit of all, and (c) to instill a faith in man's ability to solve any problem he makes. Several uses are intended for the handbook in the fields of education, professional planning, and political science in Canada, the United States, and other American nations.

Claire, WH (Gathers (Charles) and Associates); Benckert, KW (International Telephone and Telegraph); Goetsch, HA (Milwaukee, City of, Wisconsin); Mayer, HM (Kent State University); Riley, RH (Bartholomew (Harland) and Associates)
Van Nostrand Reinhold Company Book 1973, 393 pp, Figs, Tabs.

ACKNOWLEDGMENT: Van Nostrand Reinhold Company
PURCHASE FROM: Van Nostrand Reinhold Company 450 West 33rd Street, New York, New York, 10001 Repr. PC

23 057561
GERMAN HIGH-SPEED RAILROADS
Two efforts to solve Germany's rail transportation problem are being made by the country's industry and government. First, the conventional "wheel on steel" systems are being upgraded with a goal of 300 kph trains for passengers and freight. Second, development is underway of a train with a speed of 500 kph, probably riding on a near-frictionless magnetic suspension and powered by a linear induction motor. The author details planning and development for Germany and tells how this country's transportation system should eventually be an integral part of a nine-nation transportation network.

Haumann, GW *Machine Design* Vol. 45 N No. 1, Sept. 1973, pp 20-26, Phots.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: XUM Repr. PC

23 057564
THE MOVEMENT OF PEOPLE; RAPID TRANSIT IN MUNICH
This is an account of how Munich rescued its inadequate rapid transit system and made it a model of efficiency at which other (particularly larger) cities might well give close inspection.

Warren, WD *National Railway Historical Society Bulletin* Vol. 38 N 1973, pp 21-24, 4 Phot.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: National Railway Historical Society 312-314 Empire Building, Philadelphia, Pennsylvania, 19107 Repr. PC

23 057567
THE PLACE OF AIR, RAIL AND ROAD IN INTER-CITY TRANSPORT
Existing roads, railways and air services in the UK are considered in terms of their reflection of policies of continuity with change in regard to inter-city networks of transport facilities. The interface between inter-city and intra-city transport systems is seen to present complex situations which require evaluation in technological, sociological and environmental terms. Factors affecting the choice of mode of transport by inter-city passengers are defined in general terms. The inter-relation of the valuation of passenger time and modal split is shown by results from surveys within the UK. The need for clearly established hierarchies is a critical common factor with roads, rail and air services to facilitate their comprehensive planning and operation. It is argued that the continual development of the three sectors should reflect their different levels of potential as inter-city services and the benefits to industry for construction, production and marketing. Regional developments require a range of transport services for the attraction of new industries and the expansion of their existing activities; the resulting benefits are realized in social as well as economic terms. The matching of the required levels of transport service with the attributes of appropriate road, rail and air systems presents problems which cannot entirely be answered on an engineering basis. Comprehensive feasibility studies of potential developments should be a basic requirement to ensure a more positive inter-evaluation of relevant factors in engineering, economics and the environment.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Williams, TEH (Southampton University)
Institution of Civil Engineers Proceeding 1972

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm3

23 057568
RECENT DEVELOPMENTS IN INTER-CITY TRANSPORT AND THEIR RELEVANCE IN GREAT BRITAIN
The Paper examines the present state of development of the principal methods of high-speed inter-city passenger transport by air, road and rail. The problems of each mode are discussed together with their particular strengths and the markets for which they cater. The Paper then considers the likely developments of the next decade; conventional air transport is seen to be dependent for journey time improvement on ground transit systems, while the economic and environmental acceptability of vertical or short take-off aircraft is questioned. The technical potential for development on rail is considerable; mention is made of the case for completely new railway construction, and the various forms of technological innovation are discussed. The economic situation of inter-city transport in the 1980s is examined, and the Paper concludes by stating the need for a coherent national policy on inter-city transport if wasteful expenditure is to be avoided and the best solution provided.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Campbell, IM (British Railways)
Institution of Civil Engineers Proceeding 1972, pp 15-23, Tabs.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm3

23 057569
URBAN LINKS AND INTERCHANGES FOR INTER-CITY PASSENGER TRAFFIC
An essential feature of inter-city public transport services is the need for effective interchanges at the city terminals. The origins and destinations of passengers within the city conurbation are frequently widely dispersed and hence efficent interconnexion with public and private road transport, suburban rail systems and, in the case of onward journeys, other inter-city modes of travel, is essential if the full advantages of fast inter-city transport are to be achieved. Air transport presents a further complication in view of the link required between the airport and the city which it serves. The Paper discusses the forms of urban links which are required to and from rail terminals and airports. In respect of rail terminals it is suggested that personal car travel to and from the terminals should be minimized by a policy of restraint, encouragement being given to the passenger to use public transport facilities. In respect of airports, the conclusion reached is that highspeed rail transit links can overcome to some extent the disadvantages of remote airports in terms of travel time, but in addition to any such link, it is essential for good road access to be available at all stages in an airport's development.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Payne, NJ (British Airport Authority); Dennington, D (Greater London Council)
Institution of Civil Engineers Proceeding 1972, pp 23-32, 2 Tab.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

23 057573
TRANSPORTATION REQUIREMENTS FOR LA DEFENSE-A MAJOR URBAN REDEVELOPMENT SCHEME IN PARIS
This Paper reviews the conceptual development of La Defense and reports upon the construction and transportation studies that have been so far completed. La Defense is a large urban redevelopment scheme covering 2000 acres near the centre of Paris. The transport needs for this development are extensive, especially at the peak hours, and they are being provided for by a comprehensive public transport system as well as new roads and parking facilities. The public transport facilities consists of a new railway station on the national railway network (SNCF), which gives access to the western suburbs of Paris, and a new underground railway station for the recently opened mass transit system, the Reseau Express Regional. These stations are now operating and a new bus terminal for 20 lines is now under construction.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Filippi, PL (L'Etablissment Public L'Amenagement de La Defense); Dick, AC (Freeman Fox and Associates)
Institution of Civil Engineers Proceeding 1972, pp 125-134, 7 Fig., 1 Tab.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

23 057574
THE IMPLEMENTATION OF THE ELEMENTS IN THE URBAN TRANSPORT PLAN FOR THE CITY OF LIVERPOOL
The Paper briefly relates the history and the findings of the 1962 Merseyside Traffic Survey and the more sophisticated Merseyside Area Land Use/Transportation Study. A series of recommendations for the construction and operation of elements in the overall transportation plan has evolved from these studies. The Paper discusses the implementation of the major traffic management schemes in the city centre, including traffic congestion control by computer, closed circuit television surveillance and so on, combined with a centralized control of bus operations and the proposed expansion of the system into a wider area control and an outline of the Liverpool underground railway loop. The Paper concludes with a description of the works still to be carried out and the sort of timetable needed to keep up with the programme and the decisions that still have to be made.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Williams, RJ (Liverpool, City of, England)
Institution of Civil Engineers Proceeding 1972, pp 135-156, 36 Fig., 2 Tab.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

23 057575
THE EVALUATION OF AMENITY IN RELATION TO TRANSPORT COSTS AND BENEFITS
In choosing between alternative transport projects, transport cost-benefit analysis has had regard to the costs and benefits that were accrued to the providers and users of the transportation system itself, but although it has been appreciated that such systems give rise to costs and benefits to other members of the community these have not been brought into the transport evaluation. This Paper explores the means of bringing into such analysis certain of the other costs and benefits coming under the general heading of amenity. First review is made of the treatment of amenity in transport cost-benefit analysis and then of the need to widen such analysis beyond the items of amenity to the wider ranging repercussions of transportation on the communities. Indeed this would still not be wide enough since transportation should be viewed as part of urban and regional planning, and so should its evaluation. The main obstacle to the appropriate treatment of amenity in transport cost-benefit analysis has been the difficulties of measurement. The problems surrounding such measurement are explored and so is the need making the measurement in money terms. An account is given of the research advances being made in the measurement of the transport impact on amenities. Rather than complete the Paper with this review an instance is introduced of research study into the measurement of one such disamenity: that of planning blight.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Lichfield, N (University College, London)
Institution of Civil Engineers Proceeding 1972, pp 157-169, 3 Fig., 2 Tab., 37 Ref.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

23 057646
PLATOON-OPERATED STATIONS FOR QUASI-SYNCHRONOUS PERSONAL RAPID TRANSIT NETWORKS
The report focuses on the management and simulation of captive vehicles in a personal rapid transit (PRT) or dual-mode transit (DMT) system. The

simulation of a station for a quasi-synchronous network is presented. Quasi-synchronous systems allow slot slipping or advancing at interchanges to avoid merge conflicts. Vehicles are dispatched from stations with the first slot that can converge without conflict at the immediate merge point. The report is a computer simulation of vehicle operations in an off-line, single ramp personal rapid transit station. The major results of interest to station designers are the curves relating throughput to the total number of berths in the station and queue areas. Curves corresponding to 0.5% and 1% abort rates are exhibited.

Dais, JL York, HL
Minnesota University, Minneapolis, (UMTA-MN-11-0003) Sept. 1973, 30 pp

ACKNOWLEDGMENT: NTIS (PB-232700/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232700/5, DOTL NTIS

23 057671
THE FUTURE OF INTERCITY RAIL PASSENGER SERVICE IN THE UNITED STATES
U.S. rail passenger service entered an extremely critical phase in the early 1970's. The decision will soon be made—in large part by Amtrak—whether to restore an efficient national network or terminate passenger service entirely. Current trends indicate that a map of rail passenger service in the year 1980 may be nearly blank. Given the gravity of this situation, this paper outlines the future of rail passenger service with respect to two major underlying themes: (1) the relationship between mobility and economics, with special reference to Amtrak, and (2) the critical responsibility a society has for safe and sane mobility alternatives, in the three areas of ecological, aesthetic, and safety considerations. Discussion of the above topics is followed by a more purely "Geographical" presentation of service considerations involved in a socially responsible rail passenger network for the future.

This article appeared in Geographic Perspectives on the Future of American Railroads, Proceedings of the Special Session of the Annual Meeting of the Association of American Geographers, Atlanta, Georgia, April 1973.

Francaviglia, RF Silberman, AJ (Antioch College)
San Diego State University Proceeding No. 1, Apr. 1973, pp 58-74, 4 Fig., 1 Tab., 13 Ref.

ACKNOWLEDGMENT: Association of American Geographers
PURCHASE FROM: San Diego State University Department of Geography, San Diego, California, Repr. PC

23 057714
DON'T LOOK NOW, BUT ...
The New York City Transit Authority is undergoing a $2.5 billion, 40 route mile expansion. Most of the work is being done on two new subway lines and construction to further unify the Long Island Railroad with the subway system. Major improvements have been made in a new subway car design called R-44 that make it the most comfortable ride in North America.

Roberts, R *Modern Railroads* Vol. 29 No. 7, July 1974, pp 50-53

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

23 057870
THE RAPID TRAMWAY: A FEASIBLE SOLUTION TO THE URBAN TRANSPORTATION PROBLEM
This article discusses the rapid tramway, or light rail transit system as it is known in the U.S. It presents the advantages of such a system, the major of which are lower capital cost than conventional full rapid transit subways and better service than buses. The rapid tramway generally runs in subway only in the CBD, and runs on median or other reserved right-of-way in the remainder of the distance. Specific examples are given of five European systems.

Traffic Quarterly Vol. 24 No. 4, Oct. 1970, pp 513-529

PURCHASE FROM: ESL Repr. PC, Microfilm

23 057882
AN ANALYSIS OF SOME WORLD TRANSPORT STATISTICS
The main purpose of the report is to present a broad picture of trends in world passenger and goods transport by mechanical means since 1950. Estimates of passenger kilometers and ton-kilometers by road for each region are made and the trends in road transport are compared with trends in transport by rail, air and sea. The report also gives an indication of possible future growth in world transport on the basis of past trends and assumptions about future developments.

Tulpule, AH
Transport and Road Research Laboratory TRRL-LR-622, 1974, 51p

ACKNOWLEDGMENT: NTIS (PB-232940/7)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232940/7, DOTL NTIS

23 057931
REDUCING THE NEED FOR TRAVEL
The report identifies the alternative ways of accomplishing the reduction of urban travel and urban travel needs. The underlying reasons for travel are analyzed. Candidate solutions to reducing travel are described. Candidates are grouped into three classifications: communications substitutes, changes in the location and structure of cities; rescheduling of work hours. A fourth alternative, that of reshaping the need for travel through increases in the cost of travel by auto and re-education of the public plays a major role in the proposed Urban Mass Transportation Administration program.

Krzyczkowski, R Henneman, SS
Interplan Corporation Final Rpt. 7226-R, Mar. 1974, 165p

PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-234665/8, DOTL NTIS

23 071623
URBAN TRANSPORTATION ACCESSIBILITY MEASURES: MODIFICATIONS AND USES
The interaction between land-use activities and the transportation system is usually estimated by means of accessibility measures. This article discusses in general terms, the concepts, uses and mathematical formulation of accessibility measures. A new formulation of accessibility, measured by the travel impedance and the interaction between land-use activities is proposed. This measure would then be used for evaluating alternative transportation plans. It is claimed such evaluation is superior to methods of cost benefit analysis, since it takes into account not only the transportation costs but also the number of interacting land-use opportunities.

Zakaria, T *Traffic Quarterly* Vol. 28 No. 3, July 1974, pp 467-479

PURCHASE FROM: ESL Repr. PC, Microfilm

23 071766
PROGRAMMING APPROACH TO URBAN TRANSIT PLANNING
A mathematical programming model based on the objective of maximizing net social benefits is developed to evaluate the effect of introducing a personal rapid transit system into the Minneapolis transit environment. The initial solution modeled on the Minneapolis Cordon Count considers the model characteristics of a system consisting of auto, bus, and PRT. The assumption that the demand for transit is a given function of transit characteristics underlies the derivation. The two characteristics of fare and time per trip are considered. Two sets of simulations are conducted. The first consists of the analysis of changes in transit demand. The second consists of changing the modal service characteristics which involves changing the average trip time. The major conclusions are: (1) The introduction of PRT is likely to result in a greater relative reduction of automobile than in bus use: (2) changes in PRT demand and efficiency have small effects on auto and bus use; and (3) reduction in the relative time of a bus trip to be the key to increasing bus utilization.

Roe, T Shane, M *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE3, 9960, Aug. 1973, pp 571-584

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

23 071767
SCHEDULE AND TIMETABLE FOR COMMUTER RAILROAD
This paper describes a set of techniques developed to assist in planning the operations of a commuter railroad and similar types of public transport. Computer models are used for generating information and processing data with the planner making the value judgment decisions regarding the degree to which various objectives are achieved. The method attempts to balance the objectives of the user (travel time and comfort), the system operator (operating cost), and the owner-financier (capital investment). The first portion of the method deals with schedule planning, in which the overall trade offs between quality of service and costs are addressed, and the general plan of operations (such as whether or not to include express service) is developed. Once the general plan has been (tentatively) set, then the detailed construction of a specific timetable, including equipment and crew assignments, is addressed.

Morlok, EK Vandersypen, HL *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE3, 9922, Aug. 1973, pp 627-636

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

23 071768
TRENDS IN URBAN TRANSPORTATION
This paper develops a comparative basis for examining trends in urban transportation. The important variables included in the study are indicative of vehicle capacity, demand density, and size of the transportation system in vehicles per square mile. Related variables such as privacy, residential density, travel cost, and convenience in terms of waiting time are also considered. Trends in transit usage since the turn of the century are reviewed to gain insight into the relative importance of the variables and to estimate possible trends in transit service developments during the remainder of the century. It is shown that new door-to-door demand activated transit systems can fill an important gap in urban transportation services.

Notess, C *ASCE Journal of Transportation Engineering* Proceeding Vol. 99 No. TE3, 9955, Aug. 1973, pp 655-674

ACKNOWLEDGMENT: ASCE Journal of Transportation Engineering
PURCHASE FROM: ESL Repr. PC, Microfilm

23 071780
MAINTENANCE OF ELECTRIC MOTOR VEHICLES OF THE SWISS RAILROAD SYSTEM [Ueber den Unterhalt der Elektrischen Triebfahrzeuge der Schweizerischen Bundesbahnen]
Means taken towards saving of costs associated with the maintenance of railroad stock are reported. It is shown that the use of modern practical materials coupled with labor-saving means of overhauling have contributed to such cost reduction. The exchange of information, based on experience, between the manufacturer and the user of the rolling stock is claimed to be advantageous. [German]

Lilljeqvist, H *Elektrische Bahnen* Vol. 45 No. 2, Feb. 1974

ACKNOWLEDGMENT: EI (EI 74 801954)
PURCHASE FROM: ESL Repr PC, Microfilm

23 071808
WAITING TIME AND OCCUPANCY IN SYSTEMS
This paper presents the results of computer simulations of various forms of people-moving (transit) systems, with particular attention to travel and waiting components of total trip time. The formulations permit a heavier psychological weighting for the latter in comparing the various forms of service. Service options studied are: scheduled and unscheduled; all-stop, skip-stop, intermediate-stop, and non-stop from origin to destination. Comparisons are also made for a wide range of headway values and vehicle/train capacities.

Sher, NC (Honeywell Incorporated); Anderson, PA *Honeywell Computer Journal* Vol. 7 No. 4, 1973, pp 228-237, 3 Ref

ACKNOWLEDGMENT: EI (EI 74 700716)
PURCHASE FROM: ESL Repr PC, Microfilm

23 071842
ATA RAIL TRANSIT CONFERENCE HELD IN SAN FRANCISCO, CALIFORNIA ON APRIL 14 AND 16, 1974. OPERATIONS SESSIONS.
Five of the papers concern BART's operating experience including the coordination of BART with the bus service on the East side of the San Francisco Bay, passenger relations, and evolution of the BART Police Services Department. Also discussed is some of the history of the planning for BART, the highlights of operating experience and plans for future extensions of service. Four of the papers relate to ridership promotion and fare reduction or incentive techniques of winning new riders to transit. The paper by Victor Strom relates to transit energy conservation programs.

Prepared by Bay Area Transit, AC Transit, Mass. Bay Transportation Authority, Chicago Transit Authority, and Port Authority of N.Y. and N.J.

Raush, RW Bingham, AL McDowell, WW Breiner, LW Lindsey, RM American Transit Association Papers ATA/RT-74/2, Aug. 1974, 106p

ACKNOWLEDGMENT: NTIS (PB-234825/8)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB 234825/8, DOTL NTIS

23 071845
A REVIEW OF REPORTS RELATING TO THE EFFECT OF FARE AND SERVICE CHANGES IN METROPOLITAN PUBLIC TRANSPORTATION SYSTEMS
The report reviews articles and reports developed in the past ten years relating to demand elasticities for public ground intra-city transportation. It is designed to provide policy makers with a quick overview of the literature. Some major headings are: (1) an increase in fares will decrease patronage, but will result in a net increase in revenues; (2) the effect of fare increases differs depending on circumstances; (3) the relationships probably operate in the same manner with fare decreases, but in the opposite direction; (4) increased frequency will increase patronage, but no clear pattern has been found to suggest a method of numerical prediction; (5) it is difficult to judge the relative impact of each when improvements occur simultaneously; and (6) the attributes of speed, comfort, convenience, and wide choice of destination are as important as fare in attracting persons.

Holland, DK
Saint Louis University, Federal Highway Administration Final Rpt. June 1974, 26p

ACKNOWLEDGMENT: NTIS (PB-234069/3)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-234069/3, DOTL NTIS

23 071937
NORTHEAST CORRIDOR TRAVEL SURVEY, 1968-1971
The Northeast Corridor Travel Survey was conducted by the U.S. Census Bureau for the Federal Railroad Administration to determine the impact of High Speed Rail Demonstration Projects operated between Washington-New York and New York-Boston. This report publishes data from the Survey on travel by members of households residing in the Northeast Corridor for the years 1968-1971. Profiles and indices were prepared which compare person-trip information within the Northeast Corridor. Specific travel markets within the Corridor were analyzed for growth trends and shifts resulting from the improved high speed rail transportation. Data are summarized, analyzed, and displayed in appropriate tables within this report.

Whitten, HO
Whitten (Herbert O) and Associates, (DOT-TS-FRA-73-14) Final Rpt. FRA-ORD/D-74-31, Jan. 1974, 234 pp

Contract DOT-TSC-725

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-229668/9, DOTL NTIS

23 071967
IMPROVED HIGH-SPEED RAIL FOR THE NORTHEAST CORRIDOR
The report summarizes the multi-modal Northeast Corridor Study and presents a detailed plan for upgrading the railroad line in the Corridor.

Physical plant improvements and their costs are specified for achieving enhanced running times and frequencies. Demand projections are provided, and revenue and cost estimates are made for a 28 year period. The report specifies the improvements which are necessary to achieve non-stop running times of approximately two hours between Washington and New York and 2 3/4 hours between New York and Boston, and multi-stop times of 2 1/2 hours between Washington and New York and three hours between New York and Boston. The running times would be achieved with self-propelled Metroliner-type trains on a completely electrified line.

Federal Railroad Administration Jan. 1973, 108 pp

ACKNOWLEDGMENT: FRA (PB-227 781/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-227 781/2, DOTL NTIS

23 071971
AUTOMATED RAILWAY BUSINESS SYSTEM
Ticket sales, booking, inspecting and collecting, and behind-the-scenes activities, which include reports on ticket issues or statistics preparation, have been mechanized or computerized for Japan's railways.

Takao, S (Yanagicho Works, Japan); Ishizawa, T Muramatsu, K *Toshiba Review* No. 90, Apr. 1974

ACKNOWLEDGMENT: EI (EI 74 904904)
PURCHASE FROM: ESL Repr PC, Microfilm

23 071972
URBAN PUBLIC TRANSPORT IN THE UNITED STATES
The fuel shortage, plus emission control requirements on cars that decrease fuel efficiency, should contribute to alternatives for buses and automobiles for transportation. Systems described include rapid transit line haul, rubber-tire rapid transit, modified bus service, door-to-door service (dial-a-bus) and major activity center distribution techniques.

Romualdi, JP (Canadian Transport Commission) *Transportation Planning and Technology* Vol. 2 No. 3, 1974, pp 195-204, 4 Ref.

ACKNOWLEDGMENT: EI (EI 74 904868)
PURCHASE FROM: ESL Repr PC, Microfilm

23 071975
SIMULATION OF PASSENGER MOVEMENTS THROUGH A TRANSIT STATION
The simulation model being developed is a discrete-system, event-oriented representation of the movement of individual passengers through a transit station. The model is stochastic in nature with the entities of the system being the individual passengers whose movement through various activities in the station give rise to the events which drive the simulation. Station activity subsystems, such as the ticketing areas, passenger movement areas and platforms are represented by links, nodes and areas. The outputs from the model are Time Impedance Measures (e.g. Walking Times, Time spent in queue, and Total In-Station Time) and Occupancy or Density Levels (sq. ft. per person) in the movement and queueing areas of the station.

Fausch, PA Dillard, D Hoffmeister, JF *Winter Simulation Conference* Proceeding 20 Ref

ACKNOWLEDGMENT: EI (EI 74 903358)
PURCHASE FROM: ESL Repr PC, Microfilm

23 072003
THE URBAN SUBWAY [Le metro urbain]
The report provides an indepth description of the Paris Subway System. The Paris system, with 16 lines totalling 110 miles, provides a safe, frequent, high density and uniquely priced transportation network. Some of the topics discussed are: Stations built near street surfaces using the Belgian method, Trains on rails and on tires, The utilization of 750 V DC power supply by the third rail. Progressive installation of automatic command and central control, High frequency telephone communications, Safety, Passenger admission system, Traffic optimization, Maintenance, Health requirements, Evolution towards fully automated ticket sales and control, and Detailed statistical and technical data on the types of cars being used is provided. [French]

Paris Regional Metro System June 1973, 48 pp, 52 Fig.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Paris Regional Metro System Paris, France Repr. PC

23 072017
HAMBURG TRANSPORT COMMUNITY , AN EXAMPLE OF COORDINATION AND INTEGRATION IN PUBLIC TRANSPORT
The Hamburg Transport Community was established in 1965 to coordinate transport operations and integrate services. A joint fare system was introduced the following year. Public transport is no longer fragmented and services are broader. Planning is more efficient and can be better coordinated with regional planning. Competition has been eliminated, without hindering initiative on the part of the Community members, which include subway, urban, urban rail, tram, and bus lines.

Pampel, F
Hamburg Transport Community 30 pp, 13 Fig., Tabs.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Hamburg Transport Community Hamburg, West Germany Repr. PC

23 072036
TRANSPORT SYSTEMS IN NEW TOWNS
A new town one which is created deliberately too far from an existing city to be considered a regular suburb. It is designed to expand the region economically without contributing to further congestion in the parent town. Because the town is just being developed, there are no existing transportation patterns upon which projections can be based, and consequently estimates must be used. Besides internal transportation, the link between the new and the parent town is considered. This report considers the determination of transport demand, and approaches for research and planning. It gives some of the systems used and an evaluation of them. Elements common to most new towns are found to include use of buses, short walking distances to transit, use of rail to connect with the parent town, continued dependence on automobiles, and acceptance of static urban transport pattern determined for existing cities. It is recommended that future planning be based on a dynamic approach, building on a well-dimensioned infrastructure considering location of external and internal traffic generating points.

European Conference of Ministers of Transport Dec. 1973, 48 pp, 2 Tab.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Organization for Economic Cooperation and Devel Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006 Repr. PC

23 072037
PUBLIC TRANSPORT IN THE ADELAIDE METROPOLITAN REGION
The metropolitan Adelaide area is relatively uncongested for a city of its size. Current and predicted future expansion is on a north-south axis. In planning transportation for the area, objectives include maintaining the environmental quality of the area, using existing facilities fully, and keeping costs at a level justifiable on an economic basis. At present, public transport is most used during peak periods. This pattern is expected to continue. It is to be encouraged in order to avoid traffic congestion at these hours. Fare and parking policies will be used to accomplish this. The five-year transport plan will bring the existing network to a standard necessary to serve the existing city. This includes electrification of some routes, vehicle purchases, and rail extensions. Further expansion will be made in the long-term (thirty year) program.

South Australia Department of Transport Sept. 1973, 64 pp

ACKNOWLEDGMENT: TSC
PURCHASE FROM: South Australia Department of Transport Adelaide, South Australia, Australia Repr. PC

23 072047
INTER-AIRPORT CONNECTION CGN-DUC WITH A HIGH-EFFICIENCY RAPID TRANSIT SYSTEM [Flughafenverbindung CGN-DUC mit einer Hochleistungsschnellbahn]
The report projects the demand for a high-effeciency rapid transit system (HSB) between the airports of Cologne (CGN) and Duesseldorf (DUC) for 1980 and compares it to the demand of 1968. The projection is based on the existing structure of the airport access and may have to be adjusted when new systems are introduced. Investments and costs of a high effi-

ciency rapid transit access (HSB) are calculated. A table gives travel time for the airport access. [German]

Kilian
Messerschmitt-Boelkow-Blohm GmbH July 1973, 11 pp, 1 Tab., 1 Ref.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Messerschmitt-Boelkow-Blohm GmbH Munich, West Germany Repr. PC

23 072453
AUTOMATIC REVENUE COLLECTION IN BR'S LONDON AREA
Following the results of a Department of the Environment and Department of Trade and Industry study, and its own experience in the Glasgow area, British Railways has laid down the specifications for an automatic fare collection scheme to cover its extensive London commuter area. The system is intended not so much to save staff as to eliminate fraud, but without diminution of through booking facilities between BR suburban, London Transport and BR intercity services.

Railway Gazette International Vol. 130 No. 9, Sept. 1974, pp 356-359

PURCHASE FROM: ESL Repr. PC, Microfilm

23 072462
CONTROVERSY STILL CLOUDS BART PROGRAM
Bay Area Rapid Tansit has begun systemwide operation with principals and observers still debating the value of aerospace and other high-technology industry participation in the $1.6-billion venture. The evaluation may be resolved in part by the courts as BART is filing suit against its principal consultant and equipment suppliers. The transit district took this action at a time when it faces operational and financial problems that some observers find as complex and challenging as those of design, construction and start-up. BART still must prove it can provide the reliable, economical and convenient service it promised when it went to the taxpayers for support 12 years ago. Reliability and maintainability have moved to center stage.

Elson, BM *Aviation Week and Space Technology* Vol. 101 No. 16, Oct. 1974, pp 62-65

ACKNOWLEDGMENT: Aviation Week and Space Technology
PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

23 072468
LABOR COSTS AND PRODUCTIVITY FOR THE LINDENWOLD RAPID RAIL LINE AND THE SHIRLEY HIGHWAY RAPID BUS DEMONSTRATION PROJECT: SOME PRELIMINARY FINDINGS
An argument favoring a rail system rather than bus transit is that the rail mode will be less labor intensive. Since labor costs constitute the largest component of transit operating costs, the more capital intensive mode should be more productive and slow the increase of unit labor costs. This idea seems to be borne out by some of the results from the bus service in the Washington, D.C., suburbs and the rapid transit service in the Philadelphia, Pa., suburbs. Authors observe that much remains to be learned about the relative efficiency with which the modes provide passenger transportation service. They point to the need for a refined data base, better definition of transit output, and more exact identification of the capital input.

Berg, JT Miller, S Fleischman, E (Federal Highway Administration)
Transportation Journal Vol. 14 No. 1, Sept. 1974, pp 46-50, 1 Tab., Refs.

PURCHASE FROM: XUM Repr. PC

23 072470
TRAVEL DEMAND, MODE CHOICE, AND SYSTEM ANALYSIS
The seven papers examine various aspects of travel demand, modal choice and system analysis. The first examines the effects of a fare reduction in Atlanta. The second paper investigates the potential for gradually restructuring urban areas to reduce the built-in requirements for transportation. The third studies the socioeconomic characteristics of commuters and the transport service characteristics they value in their choice of mode for work trips. Two papers consider the problems of airport access. A methodology called Special Area Analysis is described in the sixth paper. The final paper describes the problem of integrating system and project planning to include all community and environmental concerns.

Transportation Research Record No. 499, 1974, 94 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Repr. PC

23 072495
PARAMETRIC ANALYSIS OF TRANSIT SYSTEM CAPACITY
In designing a passenger transportation system, two problems are the total passenger carrying capacity and the sensitivity of this capacity to variations in performance characteristics of the operating and control equipment. This paper presents a faster, more direct method than has been available to answer these questions. The equations, examples and graphs presented show that a typical urban transit route employing on-line passenger stations, trains about 450 ft long and approximately 20 second dwells can be expected to carry an average 600 ppm while operating at scheduled headway of 90 seconds and approaching stations at up to 70 mph. The calculations are a guide to early estimating of carrying capacity in a wide scope of transportation systems.

This paper was presented at the Ninth Annual Meeting of the IEEE Industry Applications Society, Pittsburgh, Pennsylvania, 7-10 October 1974.

Burgess, PM (Kaiser Engineers)
Institute of Electrical and Electronics Engineers, (74 CHO 833-41A) Proceeding Part 1, 1974, pp 323-338, 8 Fig., 3 Tab.

ACKNOWLEDGMENT: IEEE
PURCHASE FROM: ESL Repr. PC, Microfiom

23 072558
METROPOLITAN TRANSPORTATION PLANNING
While emphasizing the transportation planning process, the contributors to this volume offer an insight into an interdisciplinary approach to solving metropolitan transportation problems. Consisting of engineers and planners as well as an architect, urban designer, and landscape architect, these contributors provide a modular "problem solving" framework into which further information on various aspects of metropolitan transportation planning can be integrated. Information on different types of transportation service and impact problems is included as well as discussion on goal identification techniques. Relevant legislation and land use control mechanisms and mathematical programming techniques in solution generation and specification are offered.

Dickey, JW (Virginia Polytechnic Institute & State University)
McGraw-Hill Book Company Vol. 12 p

ACKNOWLEDGMENT: McGraw-Hill Book Company
PURCHASE FROM: McGraw-Hill Book Company 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

23 072560
CHANGING ROLES IN REGIONAL TRANSPORTATION PLANNING
Regional transportation planning in most large urban U.S. areas is now at a critical juncture. Greater attention must be given to social, economic and environmental effects of transportation. Community planning at the project phase must be strengthened. Planning for transportation corridors must be accelerated on a land-use-related, multimodal basis. Greater interagency coordination and cooperation in planning is needed, particularly with regard to intermodal linkages. The reorganization and redirection of transport planning, the authors say, should do much to resolve many of the urban problems now encountered. Really effective solutions can only be developed through the establishment of effective ongoing planning programs.

Engelen, RE Stuart, DG (Barton-Aschman Associates, Incorporated)
Traffic Quarterly Vol. 28 No. 4, Oct. 1974, pp 537-550, 3 Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

23 072562
TRANSPORTATION PLANNING IN A CHANGING ENVIRONMENT
The continuing evolution of the socioeconomic, physical and political environment for transportation planning appears to have outpaced our ability to devise a planning process. In city after city, the plans and programs of the late 1960s and early 1970s are being questioned because of their failure to anticipate changes in public values. Transportation planning can now be defined as a process of guiding the staged improvements of the metropolitan transport function in a manner that is responsive to cost, system development, impact constraints and improvement objectives. To be continuously portrayed are: (1) the existing transport system; (2) com-

mitted transportation improvement program; (3) unresolved transportation problems; (4) unforeclosed transportation opportunities. These should provide a more realistic basis for decisions on transportation in metropolitan areas.

Lockwood, SC (Voorhees (Alan M) and Associates, Incorporated)
Traffic Quarterly Vol. 28 No. 4, Oct. 1974, pp 521-536

PURCHASE FROM: ESL Repr. PC, Microfilm

23 072571
TRANSIT DEVELOPMENT PROGRAM FY 1975 TO FY 1979
This document, basically a catalog of capital improvements as proposed by the transit carriers and implementing agencies, provides a basis for developing a fundable program for transit development in the Chicago—Northwest Indiana Region over five years. It is the first time such a document has been available for collective scrutiny by those involved in the decision-making process. While there is no feasible financial plan for funding capital improvements in this document, it does provide a basis for resolving priorities, perhaps the most difficult task remaining to achieve a feasible and fundable Transit Development Program for the Region. Still to be reconciled will be capital needs and available resources. Federal and state financial sources are seen as indispensable in the Program.

Chicago Area Transportation Study Tech. Rpt. CATS 352-02, Sept. 1974, 111 pp, 56 Fig., 100 Tab., Apps.

ACKNOWLEDGMENT: Chicago Area Transportation Study
PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

23 072659
PRINCIPLES OF URBAN TRANSPORT SYSTEMS PLANNING
The processes involved in urban transport strategic planning are described in depth and within a systems type framework by the author of this precedent-setting text. Recent advances as well as the commonly used analytical methods are described thoroughly. The first part of the book covers the techniques used to estimate the travel demands that are likely to be created by a given land use arrangement including trip generation analysis, modal split analysis, trip distribution analysis and traffic assignment analysis. A family of Lowry type land use models is presented and current applications of these models to regional spatial planning are discussed. Other topics covered by this book include transport technology, concepts of urban structure, economic evaluation, urban information sources and urban goods movements.

Hutchinson, BG (Waterloo University, Canada)
Scripta Book Company 1974, 444 pp

ACKNOWLEDGMENT: Scripta Book Company
PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Orig. PC

23 072697
PROBLEMS OF TRAFFIC CONGESTION AND OF COMMUTERS IN THE PLANNING OF METROPOLITAN AND RAILROAD SERVICES [I problemi della congestione del traffico e dei pendolari nella pianificazione dei servizi metropolitani e ferroviari]
Individual automobile transport as the main cause of traffic congestion in urban areas and the remedies to solve the commuter problem are considered. The system adopted in London by the British Transport Commission, to keep quite separate urban transport from suburban and regional is explained and recommeded. A comparison is made between short distance and inter-city commuter services, which involves change of trains and the accompanying difficulties. It is suggested that metropolitan lines be gradually extended to the points where there is sufficient traffic intensity, with a traffic distribution as uniform as possible, attempting to balance it on two radial sections of a transversal line of the city. [Italian]

Patrassi, A *Ingegneria Ferroviaria* Vol. 29 No. 5, May 1974, pp 17-22

ACKNOWLEDGMENT: EI (EI 74 065265)
PURCHASE FROM: ESL Repr. PC, Microfilm

23 072709
CHARACTERISTICS OF URBAN TRANSPORTATION SYSTEMS—A HANDBOOK FOR TRANSPORTATION PLANNERS
This report consists of a handbook to be used by transportation planners and urban specialists for estimating system parameters for conventional transportation technology. Three modes are evaluated: rail transit, local bus and bus rapid transit, and highway systems. Each mode contains an assessment of the following seven selected supply parameters: speed, capacity, operating cost, energy consumption, pollutant emissions, capital costs, and accident frequency. These parameters are organized as proxy variables in describing the characteristics of each transport mode. Each mode has an analogous Appendix section whereby these parameters are evaluated in further detail and for particular geographic areas. Two additional Appendix sections contain all references used in the tables/figures and a general bibliography for further information. /Author/

Contributions to this handbook were provided by Urban Institute. This project was sponsored by the US Department of Transportation, Urban Mass Transportation Administration and Federal Highway Administration.

Sanders, DB Reynen, TA
De Leuw, Cather and Company Final Rpt. URD-DCCO-74-1-4, May 1974, 63 pp, 17 Fig., 69 Tab., Refs., 6 App

Contract DOT-UT-20019

ACKNOWLEDGMENT: Federal Highway Administration
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-233580, DOTL NTIS

23 072759
TRANSPORTATION AND THE PROSPECTS FOR IMPROVED EFFICIENCY
This publication contains a collection of papers from an NAE Symposium. Several of the papers are related to rail rapid transit systems and to commuter railroad operations. Specific papers deal with planning for transportation in Dallas, Chicago, and San Francisco.

A Symposium sponsored by the National Science Foundation, Department of Housing and Urban Development, Department of Transportation and the National Academy of Engineering at its Eighth Autumn Meeting October 12 and 13, 1972.

National Academy of Engineering 1973, 270 pp, Figs., Tabs., Phots.

PURCHASE FROM: National Academy of Sciences 2101 Constitution Avenue, NW, Washington, D.C., 20418 Repr. PC

23 072767
TRANS GUIDE: A COMPENDIUM OF INFORMATION ON PUBLIC TRANSPORTATION WITH EMPHASIS ON CALIFORNIA
The changing role of the State Department of Transportation, exemplified by the emerging Division of Mass Transportation, has revealed a need for a central source of reference on other transit organizations, both in State and nationwide. This guide was developed in response to that need. In addition to organizational information, this volume contains several reports on the status of "State of the Art" of various transit modes and transit related operations.

California Department of Transportation Jan. 1974, Figs., Tabs.

ACKNOWLEDGMENT: California Department of Transportation
PURCHASE FROM: California Department of Transportation Division of Mass Transportation, Sacramento, California, 95807 Rerp. PC

23 072839
EVALUATION OF TRANSPORTATION EQUIPMENT TECHNOLOGY FOR USE IN THE BALTIMORE REGION RAPID TRANSIT SYSTEM
The report reviews current and anticipated development in transit system operations equipments as they may particularly apply to the proposed rapid transit system for the Baltimore Region. The primary objective of this evaluation was to provide a realistic set of alternatives upon which to base decisions as to the inclusion of advanced techniques and equipment in the preliminary engineering of the transit system. New concepts and improvement of well-established techniques are examined. Recommendations are included for various system components and subsystems.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Daniel, Mann, Johnson, and Mendenhall June 1968, 186 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-180093, DOTL NTIS

23 072841
URBAN RAPID TRANSIT CONCEPTS AND EVALUATION
The several aspects of urban rapid transit systems are reviewed from the standpoint of developing them according to the dictates of population and employment distribution patterns, rather than by conventional, and uneconomical, restrictive grade and curvature criteria. Included in the discussion are vehicle design, guideway substructure and superstructure, and analysis of regional-local transit system transfer interfaces. Present technology capabilities are illustrated by examples of various types of urban and interurban systems.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Hoel, LA Lepper, RL
Carnegie-Mellon University 1968, 241 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Carnegie-Mellon University Transportation Research Institute, Pittsburgh, Pennsylvania, 15213 Repr. PC

23 072845
SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT DEMONSTRATION PROJECT, SUMMARY
The San Francisco Bay area rapid transit district demonstration project was conducted on a four and one-half mile test track. The purpose of the demonstration project was to test and evaluate new technical concepts in the field of rapid transit. These concepts included a variety of advanced hardware as well as completely automatic train control and automatic fare collection systems.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Parsons, Brinckerhoff-Tudor-Bechtel Final Rpt. Jan. 1970, 73 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: Parsons, Brinckerhoff-Tudor-Bechtel 814 Mission Street, San Francisco, California, 94103 Repr. PC

23 072860
CITIZEN PARTICIPATION IN TRANSPORTATION PLANNING: THE BOSTON EXPERIENCE
This book examines "citizen participation" and the way it influences changes in basic public policy. It focuses on on the recent experience of metropolitan Boston with its transportation plan and program—a program which was dramatically altered by recent decisions of the governor of Massachusetts to scrap plans for completing expressway projects that had been in the process of construction for some years. Behind the governor's decisions is the story of a new method of doing business in transportation planning, a method that among other features called for "public participation" in the process of drawing up plans and recommending programs.

Sloan, AK
Ballinger Publishing Company 1974, 180 pp

ACKNOWLEDGMENT: Ballinger Publishing Company
PURCHASE FROM: Ballinger Publishing Company 17 Dunster Street Harvard Square, Cambridge, Massachusetts, 02138 Repr. PC

23 080072
THE IMPORTANCE OF TIME SPENT AT STATION STOPS
The demand for high schedule speeds must be met by ensuring effective passenger interchange at stations and circulation within the coaches. To facilitate this, doors should be provided every 4,000 to 5,500 mm. These should offer a 1,250 to 1,300 mm wide passage. A space of 350 to 375 mm should be provided between door edge and partition for standing passengers, who will thus be moved out of the path of entering or leaving passengers. The use of swing-sliding (ss) doors will permit a simpler and lighter body structure and reduce draughts and at the same time improve noise insulation.

Koffman, JL *Rail Engineering International* Vol. 4 No. 6, July 1974, 3 pp, 1 Fig.

ACKNOWLEDGMENT: Rail Engineering International
PURCHASE FROM: ESL Repr. PC, Microfilm

23 080078
DESIGN AIMS AND SCOPE FOR RAPID-TRANSIT SYSTEMS [Aufgaben und Moglichkeiten des Designs fur S-Bahnen]
Among the manifold tasks of the DB's Design Centre is the furnishing of ideas for the best passenger-oriented equipment of rapid-transit rail vehicles, and also proposals concerning the construction of the transit system as a whole. The work of the Design Centre is described. [German]

Radlbeck, K *Eisenbahntechnische Rundschau* Vol. 23 No. 7/8, July 1974, pp 313-317, 7 Fig., 2 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel undDr. Strauss, Darmstadt, West Germany Repr. PC

23 080079
USE OF NETWORK TECHNIQUES BY THE FEDERAL RAILWAY DIRECTORATE FOR TIMETABLE COMPILATION [Die Bearbeitung der Fahrplanunterlagen bei der Bundesbahndirektion]
By the use of network techniques it is sought to obtain a clear representation of all the interrelated objective and time factors involved in the production of railway timetables, and thus to facilitate and speed up this work. [German]

Krittian, W *Eisenbahntechnische Rundschau* Vol. 23 No. 9, Sept. 1974, pp 374-380, 4 Fig., 2 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

23 080110
INTERMODAL TRANSFER FACILITIES
The papers describe various aspects of passenger terminals, interchanges whose scope includes anything from a transit platform to a multimodal regional transportation center. Despite this broad spectrum, passenger terminals have common design elements which these five papers address. The first describes principles of different modes to have access to outlying rapid transit terminals. The second describes studies on boarding the alighting time requirements for bus and trolley services. The next paper contains an analysis of park-and-ride lots. The movements of pedestrians in transit stations is next discussed. TRB's Committee on Intermodal Transfer Facilities has developed a general outline and classification for the elements in a typical passenger transfer facility.

These four reports were prepared for the 53rd Annual Meeting of the Highway Research Board.

Transportation Research Record TRR No. 505, 1974, 47 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Repr. PC

23 080212
SOUTH SHORE RAIL RAPID TRANSIT EXTENSION. PRELIMINARY IMPACT STUDY
The major goal of the report is to increase the understanding of impacts of this transit extension with the view toward the planning of future extensions. The major data source for the study was a ridership survey. The questionnaire was developed to determine a variety of ridership characteristics and transit extension impacts;i.e., time of use, mode of transportation to the station, previous mode of travel, origin, destination, reasons for use, propensity to transfer, time saved or lost, and a variety of socioeconomic characteristics. A sample questionnaire is included in this report. Chapters include the introduction-methodology, historical review, planning considerations, engineering design aspects, ridership characteristics, impacts on traffic volume and patterns, economic impacts, and land use impacts. Conclusions are presented. A bibliography is furnished.

Boston Metropolitan Area Planning Council, Urban Mass Transportation Administration, Massachusetts Bay Transportation Authority, (UMTA-MA-09-0010) Oct. 1973, 175 pp

ACKNOWLEDGMENT: NTIS (PB-237048/4ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-237048/4ST, DOTL NTIS

23 080213
DESIGN AND ANALYSIS OF AN AUTOMATIC CREDIT CARD FARE COLLECTION SYSTEM
The concept of an automatic fare collection system that accepts bank credit cards for payment of fares is examined. The fare collection system is composed of two major sub-systems. The on-vehicle system includes all fare-related activities conducted inside the vehicle. The off-vehicle system is all fare-related activities that are separated from user transactions in the vehicle, by time and space. There are four areas of interest in the design of the off-vehicle system. The fare structure of the transit system is one determining factor in the system design. The needs of management for data, in addition to that required for computation of user fares, is also an important consideration. The data processing system uses data inputs from the on-vehicle system to generate management reports. Lastly, billing involves the generation of billing information on magnetic computer tapes which are then delivered to the respective banks for customer billing. Various possible configurations of on-vehicle hardware are studied.

Buckley, RF Carlson, RC Jucker, JV
Stanford University, Urban Mass Transportation Administration, (UMTA-CA-11-0008) Res. Rpt. RR-16, Aug. 1974, 64 pp

ACKNOWLEDGMENT: NTIS (PB-237092/2ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-237092/2ST, DOTL NTIS

23 080251
TRAVELTIME BUDGETS AND MOBILITY IN URBAN AREAS
The study tests by empirical comparative analysis the concept that tripmakers have a stable daily traveltime budget and discusses the implication of such a budget to transportation modeling techniques and the evaluation of alternative transportation systems. After verifying the stability of the traveltime budget for both macro and micro conditions, the responsiveness of travel demand to system supply is developed and formulated. Many known travel factors, such as the levels of mobility, modal choice and trip purpose splits, are then explained by a unified behavioral mechanisms. One of the many conclusions that are presented in the study is that extreme care should be exercised in evaluating policy decisions such as speed reductions and pricing policies without first establishing the sensitivity and responsiveness of mobility to such restrictions. This conclusion is of special significance at this time when fuel shortages threaten mobility.

Zahavi, Y
Zahavi (Yacov), Federal Highway Administration Final Rpt. May 1974, 90 pp

Contract DOT-FH-11-8183

ACKNOWLEDGMENT: NTIS (PB-234145/1)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-234145/1, DOTL NTIS

23 080342
LENGTH OF WALKING DISTANCES AND DISTANCE BETWEEN STOPS: THEIR INFLUENCE ON THE ATTRACTIVENESS OF PUBLIC TRANSPORT
Walking distance as a factor in providing adequate public transportation is closely related to distance between stops (stations), route (line) alignment and land use planning. The size of the catchment area of a stop, i.e. the area from which passengers come, is expressed in geometrical terms. The position of the stops in their urban environment defines the catchment area of a route; in the ideal network, the catchment areas of parallel routes would overlap. Data relative to walking distances have been obtained empirically and are based on many years of experience; further investigation of the subject is suggested.

Bandi, F Brouwer, P Conde Cabeza, M Nyst, J Lehner, F *Union Internationale des Transports Publics, Revue* Vol. 23 No. 3, 1974, pp 175-181

ACKNOWLEDGMENT: International Union of Public Transport
PURCHASE FROM: International Union of Public Transport 19 Avenue de l'Uruguay, Brussels B-1050, Belgium Repr. PC

23 080354
ALGORITHM FOR MECHANOGRAPHIC DETERMINATION OF THE TIMETABLES OF URBAN TRANSPORT LINES [Un Algorithmo per la determinazione meccanografica degli orari delle lince urbane di trasporto]
An algorithm is proposed for the mechanized determination of the timetables of urban transport lines, which in contrast with the methods used in the past, makes use of manual techniques with the necessary schematization. The procedure, an example of which is given, eliminates the possibility of an increase in vehicles as compared with those strictly necessary and minimizes the periods of standing at terminals. [Italian]

Piccione, C *Ingegneria Ferroviaria* Vol. 29 No. 6, June 1974, pp 35-40

ACKNOWLEDGMENT: EI (EI 74 080402)
PURCHASE FROM: ESL Repr. PC, Microfilm

23 080414
HIGH SPEED RAIL TRANSPORTATION. NEW YORK CITY TO ALBANY
The development of the MTA airport/commuter link from New York City to Stewart Airport at Newburgh, about 60 miles north of New York City on the west side of the Hudson River, opens the possibility of a high-speed passenger rail route in the New York City/Albany corridor. Comparisons of east-side and west-side service are made on basis of grades, curvatures, train types, travel times, communities served, ridership, economics of track improvement, and a computer simulation model. The east side has a higher speed potential, but there are more communities on the west side. The Albany station should be restored (in spite of the space conflict with Interstate 787), and used as well in Boston-Chicago service. A considerable amount of technical information is included.

Continuation of Grant NSF-GT-32162. Inst., Troy, N.Y. School of Engineering.

Assarabowski, RJ
New York State Assembly Scientific Staff, National Science Foundation, Rensselaer Polytechnic Institute Final Rpt. SS-408, May 1974, 86p

Grant NSF-ISR72-95606-A02

ACKNOWLEDGMENT: NTIS (PB-236984/1SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236984/1SL, DOTL NTIS

23 080417
PAPERS PRESENTED AT THE WAYS AND STRUCTURES AND GENERAL SESSIONS OF THE ATA RAIL TRANSIT CONFERENCE HELD IN SAN FRANCISCO, CALIFORNIA ON APRIL 16 AND 18, 1974
Four of these papers concern problems facing the Bay Area Rapid Transit District and the way they are being resolved. Mr. McCutcheon discusses tunnel ventilation, Mr. Mahon deals with track maintenance as well as building and grounds and fire prevention. Mr. Storey deals with measuring vehicle noise and Mr. Todd discusses means of minimizing electrical leakage from running rails. Mr. Lawrence discusses recently completed tunnel construction in Toronto as well as the current construction of the Spadina subway and the unique geology water and vibration problems encountered. The paper by Mr. Reed and Mr. Harris deals with the National Transportation Safety Board and its work with rail rapid transit systems. Mr Aboudara describes the Transit Development Corporation and three of its on-going projects.

Todd, P Storey, HE Lawrence, ST McCutchen, WR Mahon, VP
American Public Transit Association, National Transportation Safety Board, Transit Development Corporation, Incorporated, Bay Area Rapid Transit District ATA-RT-74-4, Sept. 1974, 140p

ACKNOWLEDGMENT: NTIS (PB-236563/3SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236563/3SL, DOTL NTIS

23 080419
SOFTWARE SYSTEMS DEVELOPMENT PROGRAM. DEMAND MODEL SELECTION MANUAL
The manual describes procedures for selection of demand models used in forecasting urban travel. It was prepared for UMTA under its Software Systems Development Program (SSDP) and is designed as an integral part of the UMTA Transportation Planning System (UTPS). The purpose of the manual is to instruct the planner on how to develop criteria and formulate hypotheses to guide the selection and testing of demand models in the context of overall travel forecasting process.

See also PB-236847 thru PB-236-849, TRIS 080419-080422.

Peat, Marwick, Mitchell and Company, Urban Mass Transportation Administration, Cambridge Systematics, Incorporated, (UMTA-IT-06-0050) URD.PMM.75.5.1, June 1974, 53p

Contract DOT-UT-20020

ACKNOWLEDGMENT: NTIS (PB-236089/9SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236089/9SL, DOTL NTIS

23 080420
SOFTWARE SYSTEMS DEVELOPMENT PROGRAM. INTRODUCTION TO URBAN TRAVEL DEMAND FORECASTING. SUMMARY
The summary report serves as a guide to Volumes I and II. An overview of UTPS is presented and the purposes of travel forecasting in terms of sketch planning and long-range and short-range planning are discussed. Within the scope of transportation planning, the range of options, impacts and principles are considered. Guidelines to the use of the manual are outlined. References are furnished.

Peat, Marwick, Mitchell and Company, Urban Mass Transportation Administration, Cambridge Systematics, Incorporated, (UMTA-IT-06-0050) URD.PMM.74.3.1, Mar. 1974, 45p

Contract DOT-UT-20020

ACKNOWLEDGMENT: NTIS (PB-236847/0SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236847/0SL, DOTL NTIS

23 080421
SOFTWARE SYSTEMS DEVELOPMENT PROGRAM. INTRODUCTION TO URBAN TRAVEL DEMAND FORECASTING. VOLUME I. DEMAND MODELLING
The Urban Mass Transportation Administration Transportation Planning System provides a wide range of analytical and computerized tools for making travel forecasts for existing and proposed transportation systems. The manual provides an introduction to travel forecasting to enable transportation planners and analysts to utilize UTPS effectively. It provides a comprehensive overview of the methodology of travel forecasting, the analytical tools available and their appropriateness for typical problems the transportation planner faces, input requirements, outputs needed for proper evaluation, and appropriate levels of effort for various stages of analysis. The manual is divided into three parts: The Summary; Volume I-Demand Modelling; and Volume II- Evaluation.

Peat, Marwick, Mitchell and Company, Urban Mass Transportation Administration, Cambridge Systematics, Incorporated, (UMTA-IT-06-0050) URD.PMM.74.1.1, Mar. 1974, 313p

Contract DOT-UT-20020

ACKNOWLEDGMENT: NTIS (PB-236848/8SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236848/8SL, DOTL NTIS

23 080422
SOFTWARE SYSTEMS DEVELOPMENT PROGRAM. INTRODUCTION TO URBAN TRAVEL DEMAND FORECASTING. VOLUME II. EVALUATION
In the report, Volume II, an evaluation of transportation alternatives is made and discussion centers around the evaluation problem, methods of community interaction, prediction of and incidents of impacts, evaluation methods, and extended evaluation method. A summary is presented and references are furnished.

Peat, Marwick, Mitchell and Company, Urban Mass Transportation Administration, Cambridge Systematics, Incorporated, (UMTA-IT-06-0050) URD.PMM.74.2.1, Mar. 1974, 80p

Contract DOT-UT-20020

ACKNOWLEDGMENT: NTIS (PB-236849/6SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236849/6SL, DOTL NTIS

23 080424
BART IMPACT PROGRAM: METHODOLOGICAL APPROACH FOR DEFINING THE GENERALIZED NO-BART ALTERNATIVE (GNBA)
The Generalized No-BART Alternative is the hypothetical transportation system judged most likely to have resulted in the Bay Area in FY 1976 if BART had not come into existence. The purpose of the paper is to explain how MTC intends to define the GNBA and the role to be played in the process by findings from the decision history of BART. It is structured in three parts: (1) Introduction to basic concepts and criteria; (2) overview of methodological approach and guidelines for implementation; and (3) application of criteria for defining the GNBA.
Working Paper

Rosenthal, SR
Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development, (WP-10-1-75) MTC-WP-10-1-75, Oct. 1974, 23p

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS (PB-237357/9SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-237357/9SL, DOTL NTIS

23 080469
JAPAN'S FAMED BULLET TRAINS SHOW THEIR AGE
Trains on the $5-billion Shinkansen operate on welded rail roadbeds constructed exclusively for high-speed passenger service and the road has a large maintenance crew. But the system is breaking down nowadays and the Japanese are being reminded that it is no longer new. Troubles include all sorts of things from malfunctioning electrical circuits and cracks in the rails to defective coaches.

Business Week No. 2363, Jan. 1975, pp 88-89

PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

23 080646
REVIEW OF SOME ANTICIPATED AND OBSERVED IMPACTS OF THE BAY AREA RAPID TRANSIT SYSTEM
The report briefly summarizes some of the most important impacts of the Bay Area Rapid Transit System as revealed by a survey of the Technical and Nontechnical Literature. The report has been prepared as a Reference and Planning Guide for the BART Impact Program. It describes both anticipated Impacts that have been stated by Public, Officials, Planners, and Observers since BART was planned more that a decade ago, and actual Impacts as reported in newspapers and in the few Technical Studies of Bart Impact that have been already performed. No attempt is made to prove or disprove the statements about Impacts that have appeared in print. About 100 technical and planning reports and 4,500 newspaper articles were scanned.
Planning Document.

Peat, Marwick, Mitchell and Company, Metropolitan Transportation Commission PD-3-1-74, May 1974, 71 pp

Contract DOT-OS-30176

ACKNOWLEDGMENT: NTIS (PB-237309/0ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-237309/0ST, DOTL NTIS

23 080655
1972 NATIONAL TRANSPORTATION STUDY. POPULATION PROJECTIONS BY STATES, URBANIZED AREAS AND OTHER GEOGRAPHIC AREAS
The report, tabulated from demographic data in support of 1972 National Transportation Report, provides the user with population projections by state, urbanized areas and small urban, and rural under 1990 Boundaries. Because 1990 Boundaries are the basis for National Transportation Requirements, the 1960 and 1970 population detail is adjusted for those areas less than 50,000 persons, but which would contain such population by 1990, and are therefore treated as urbanized areas. Totals for urbanized areas may not be consistent to Census totals for these reasons but agree with state control totals and national aggregates.

Department of Transportation May 1973, 60 pp

ACKNOWLEDGMENT: NTIS (PB-237512/9SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-237512/9SL, DOTL NTIS

23 080764
AMTRAK ROLLS ON DESPITE POWER STRUGGLE
Despite efforts to remove Amtrak's president, Roger Lewis, Amtrak met the peak summer travel needs in a commendable manner. New rail routes have been added or proposed and new equipment is on order. A shortage of cars have postpond the opening of some of the routes. Among new

equipment that has been ordered are seven, French designed Turbo Trains. The U.S. Department of Transportation is critical of Amtrak's operating and some phases of its performance. It is the Senate which approved Roger Lewis's appointment and has urged the Department of Transportation to continue funding Amtrak.

Modern Railroads Vol. 29 No. 9, Sept. 1974, pp 49-51

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

23 080775
PLANNING MASSIVE ACCESSIBILITY FOR CENTRAL ATLANTA: A STUDY OF MISLEADING PROJECTIONS
Urban transportation planning in Atlanta has evolved in the 1950's and 1960's on the premise the massive new accessibility is needed for the Central Area of the city to accommodate vast increases in downtown trips. Projections have been made with little concession to reality, stemming from an unwillingness to collect and study existing data and trends. Peak hour trips to the Central Area have stabilized, but more radial capacity is being proposed. The Atlanta fixed rail rapid transit program has been justified by the doctrine of massive new accessibility for the downtown area. Little consideration was given to busways, and benefit/cost studies did not compare alternate systems. Also, instead of casting mass transit as a substitute for additional freeway construction, the local transit agency, MARTA, has agreed to support a new expressway network also focusing on the Central Area.

Hamer, A Hartshorn, T (Georgia State University) *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 291-302, 3 Fig., 24 Ref.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

23 080788
WATCH FOR A BOOM IN LIGHT RAIL
Cities too small for full-scale rapid transit, yet too big to rely on buses alone, are discovering an intermediate alternative. A number of U.S. and Canadian cities are looking at lightly used freight lines or the remnants of old interurban systems as the right-of-way for routes separated from street traffic. The examination of the potential by planners and administrators is detailed.

Kizzia, T *Railway Age* Vol. 175 No. 15, Aug. 1974, pp 16-21, 5 Phot.

PURCHASE FROM: XUM Repr. PC

23 081185
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART I. OVERVIEW AND SUMMARY
The report is a summary of the work undertaken under the BART-II contract dealing primarily with selected aspects of environmental effects, land use, and retail sales. Chapters include background to the BART impact studies and a discussion of the nature and conduct of the BART-II studies. Also included are an outline of the administrative organization, a list of participants in the conduct of the studies, a list of related papers and reports, and a listing of data products.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 2, Volume 1, PB-236 728.

California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. June 1973, 51p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236727/4ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236727/4ST, DOTL NTIS

23 081186
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART II. VOLUME I. VALIDATION CHECK OF SYSTEMWIDE SOCIAL AND DEMOGRAPHIC DATA
The report evaluates the validity of the sampling strategy and its implementation used in the system-wide home interview survey random sample for the residential environment impact study. The study itself is outlined. Chapters include the rationale of the sampling strategy, procedure, results, discussion, implications, and suggestions for future data collection.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 1, PB-236 727, and BART-2, Part 2, Volume 2, PB-236 729.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 50p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236728/2ST)
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PB-236728/2ST, DOTL NTIS

23 081188
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART II. VOLUME II. CONTROL STRATEGIES
The report documents the need for using controls in a study such as the residential impact study, and discusses the special problems encountered with regard to controls. It outlines the general research design and the two complementary branches of that design—the system-wide random sample approach and the selected site approach, and it describes in detail the control strategy adopted for each branch. Also included is a review of some research design problems inherent in impact studies in general.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 2, Volume 1, PB-236 728, and BART-2, Part 2, Volume 3, PB-236 730.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 78p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236729/0ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236729/0ST, DOTL NTIS

23 081189
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART II. VOLUME IV. RATIONALE AND PROCEDURE FOR THE COLLECTION OF PRE-BART GEOGRAPHIC, CENSUS AND SECONDARY DATA FOR THE SYSTEMWIDE STRATEGY
The report presents the rationale and procedure for the collection of the geographic, census and secondary data used in the assessment of BART'S impact on the residential environment. It includes an outline and overview of the residential impact study, especially the system-wide branch of the study, and a detailed discussion of the variables of interest to the study. Chapters include discussions of the use of the data in developing criteria of environmental quality and of the procedure for gathering and coding data.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 2, Volume 3, PB-236 730, and BART-2, Part 2, Volume 5, PB-236 732.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 128p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236731/6ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236731/6ST, DOTL NTIS

23 081190
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART II. VOLUME VI. RATIONALE AND PROCEDURES FOR COLLECTION OF BEHAVIORAL AND ENVIRONMENTAL DATA
The report presents the rationale for the collection of behavioral and environmental survey data for the residential impact study and documents the procedures used to collect this data. It places these surveys in the overall

research design by outlining the study's two strategies with special attention to the site' strategy. The environmental qualities, which form the basis of all the data collection, are introduced. The environmental and behavioral surveys and also the resident interview are discussed. The development of the surveys and the field data collection methods are presented, and each of the environmental qualities is discussed in terms of the specific environmental and behavior measures related to it.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 2, Volume 5, PB-236 732, and BART-1, Part 2, Volume 1, PB-236 734.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. June 1973, 463p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236733/2ST)
PURCHASE FROM: NTIS Repr. PC, Mircofiche

PB-236733/2ST, DOTL NTIS

23 081191
BART-I: TRAVELER BEHAVIOR STUDIES. PART II. VOLUME I. PRE-BART TRAVELER ATTITUDES AND PERCEPTIONS: EAST BAY PANEL

This is a report on interviews conducted with a panel of east bay residents shortly before the first section of BART became operational with the overall objective of studying the BART travelers environment and his responses to it. Chapters include collection of pre-BART data, characteristics of the panels, information about BART, sources of information, general attitudes toward BART, expected similarity to other modes, comparision of BART, automobile and bus, intended use of BART, types of BART lines, the BART car, BART stations, and the construction period.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 2, Volume 6, PB-236 733, and BART-1, Appendix A, PB-236 735.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. May 1973, 346p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236734/0ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236734/0ST, DOTL NTIS

23 081192
BART-I: TRAVELER BEHAVIOR STUDIES. APPENDIX A. SAMPLE DESIGN AND FIELD RESULTS OF THE TRAVELER STUDY

The report, describes the sampling methods and summarizes the field results of the traveler study. It is divided into six sections—objectives and overall strategy, population definition, sampling fractions and stratification, selection of tracts, blocks, and housing units, screening, subsampling and respondent selection, and weighting. A map of the study area is also included.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-1, Part 2, Volume 1, PB-236 734, and BART-1, Part 1, PB-236 736.

Nicholls, WLII
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. May 1973, 25p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236735/7ST)
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PB-236735/7ST, DOTL NTIS

23 081193
BART-I: TRAVELER BEHAVIOR STUDIES. PART I. OVERVIEW AND SUMMARY

The report is an overview and summary of the studies undertaken as part of the BART-I contract dealing with various aspects of pre-BART travel behavior. The survey includes the traveler study, the travel demand forecasting study, and the unmet travel needs study.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-1, Appendix A, PB-236 735, and BART-1, Part 2, Volume 3, PB-236 737.

California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. May 1973, 52p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236736/5ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236736/5ST

23 081195
BART-I: TRAVELER BEHAVIOR STUDIES. PART II. VOLUME III. ANALYSIS OF BART TRAVELER INQUIRIES

The inquiry analysis project attempts to document one facet of the traveler's early experience of BART by recording and analyzing questions the travelers asked the station agents. Chapters include method, product, and discussion. Three appendices include schedules and listings of the data collected.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-1, Part 1, PB-236 736, and BART-1, Part 2, Volume 2, PB-236 738.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. May 1973, 79p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236737/3ST)
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PB-236437/3ST, DOTL NTIS

23 081196
BART-I: TRAVELER BEHAVIOR STUDIES. PART II. VOLUME II. BART TRAVELER ENVIRONMENT: ENVIRONMENTAL ASSESSMENT METHODS FOR STATIONS, LINES, AND EQUIPMENT

The report concentrates on the development of methods for describing and assessing the BART travelers' environment— the stations, systemwide components, cars, and lines—in a form that can be validated by the travelers' response. Chapters include environmental qualities (station indicators), station assessments, a line assessment system, automatic fare-collection assessment, and assessment of the BART car.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-1, Part 2, Volume 3, PB-236 737, and BART-1, Part 3, PB-236 739.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. May 1973, 156p

Contract DOT-OS-90023

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PB-236738/1ST, DOTL NTIS

23 081197
BART-I: TRAVELER BEHAVIOR STUDIES. APPENDIX C. SUMMARY AND WORKING PAPERS. BAS-1 UNMET TRAVEL NEEDS STUDY

The report presents an analysis of the Bay Area survey to delineate the nature and extent of 'transportation disadvantage' in terms of the categories and location of persons who lack access to motor vehicles.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-1, Part 3, PB-236 739, and BART-2, Part 3, Volume 1, PB-236 741.

Foley, DL
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. May 1973, 118p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236740/7ST)
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PB-236740/7ST, DOTL NTIS

23 081198
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART III. LAND USE AND INVESTMENT. VOLUME I. ECONOMETRIC STUDIES
The first part of the land use and investment study presents the collection and preliminary analysis of econometric data on land prices in portions of the Bay Area (homogeneous neighborhoods in central Contra Costa County).

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-1, Appendix C, PB-236 740, and BART-2, Part 3, Volume 2, PB-236 742.

Lee, DBJ
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. June 1973, 120p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236741/5ST)
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PB-236741/5ST, DOTL NTIS

23 081199
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART-III. LAND USE AND INVESTMENT. VOLUME III. CASE STUDIES
The volume covers case-study analysis of BART's impact on selected parcels of property from the standpoint of the real estate appraiser. It includes—a summary and conclusions; the seventeen case studies preceded by a general description of case characteristics; and a discussion of the development of a methodology for estimating the dollar-value of the impact of a major public investment—such as BART—on a specific piece of real property.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 3, Volume 2, PB-236 742, and BART-2, Part 3, Volume 4, PB-236 744.

Lee, DBJ
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 89p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236743/1ST)
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23 081200
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART III. LAND USE AND INVESTMENT. VOLUME IV. MARKET STREET STUDY
The study is an attempt to apply the methodology developed in Volume III for appraising the dollar-impact of BART on real properties to downtown San Francisco. The report establishes the framework of the study by presenting a discussion of the underlying theory of land use and of the economic characteristics of downtown development and by describing the study methodology. Results of a large number of case studies are presented and the effects of BART on downtown San Francisco are estimated.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 3, Volume 3, PB-236 743, and BART-2, Part 3, Volume 5, PB-236 745.

Lee, DBJ
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 146p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236744/9ST)
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PB-236444/9ST, DOTL NTIS

23 081201
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART III. VOLUME VI. IMPACTS OF BART ON PRICES OF SINGLE FAMILY RESIDENCES
The report presents a statistical analysis of the effect of the anticipation of BART service on sales values of single family homes in central Contra Costa County. Chapters include discussion of longitudinal residential samples, cross-sectional residential samples, and a commerical sample.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 3, Volume 5, PB-236 745, and BART-2, Part 4, PB-236 747.

Lee, DBJ
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 53p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236746/4ST)
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PB-236746/4ST, DOTL NTIS

23 081202
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART IV. BART IMPACT ON RETAIL SALES
The report presents a study to determine the impact of BART on consumer shopping in the Bay Area. The first part establishes baseline data on retail sales in order to make possible eventual evaluation of post-BART alterations. The second part develops a questionnaire for use in measuring BART's effect upon consumers' attitudes toward and choices of different shopping centers. Chapters include an overview of the baseline studies, baseline study of retail sales, and the attitude study.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 3, Volume 6, PB-236 746, and BART-2, Appendix A, PB-236 748.

Bucklin, LP
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 58p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236747/2ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236747/2ST, DOTL NTIS

23 081270
THE LIGHTING OF UNDERGROUND RAILWAY INSTALLATIONS [Beleuchtung von unterirdischen Bahnanlagen]
On the basis of the DIN and VDE instructions, directives have been laid down on the subject of lighting installations for new urban and suburban lines. The writers explain the scope of application, the objective pursued and the requirements imposed with regard to this lighting. There are different criteria for installation intended for the public, for operating tunnels, and in passenges for maintenance services. Finally, the writers deal with emergency lighting and the operation of lighting installations on the ground level and underground platforms. [German]

Oberosler, T Pfannkuch, H *Eisenbahningenieur* Vol. 25 No. 4, Apr. 1974, pp 118-126, 6 Fig., 2 Tab.

ACKNOWLEDGMENT: International Railway Documentation, Selection of (UIC Serial No. 887)
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

23 081380
GROUP CONTROL SYSTEM FOR TICKET-VENDING MACHINES
To dispense the large volume of short-trip tickets required on Japanese National Railways, automatic ticket vending machines have been introduced. In major stations, group control systems have been developed to coordinate change supply, coin collection by means of conveyors, automatic counting and logging of sales. Two systems are used, a small-scale

one for controlling less than ten machines and a larger one for more than ten vending machines. One operator can supervise large banks of these machines efficiently.

Murato, K (Japanese National Railways) *Japanese Railway Engineering* Vol. 15 No. 1, 1974, pp 14-18, 7 Fig., 4 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

23 081628
MASS TRANSIT AND THE POLITICS OF TECHNOLOGY: A STUDY OF BART AND THE SAN FRANCISCO BAY AREA
This is a book about the political consequences of technological choice. The substantive portion of the book deals with two public transit agencies in the San Francisco Bay Area. The author is more concerned, however, with the issues of politics and technology than with those of transportation. This is, therefore, a book about how two different technologies coping with transportation problems can produce significantly different consequences. The intention is to demonstrate how proposals for large-scale technological systems, such as BART, have social and political consequences that were neither intended nor anticipated.

Zwerling, S *Praeger Special Studies in US Eco Soc & Pol Issues* 1974, 159 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Praeger Publishers, Incorporated 111 Fourth Avenue, New York, New York, 10003 Orig. PC

23 081947
AN AGGREGATE URBAN TRANSPORTATION MODEL: ECONOMETRIC SPECIFICATION
Many transportation researchers have concerned themselves with a single problem. They have devoted a great deal of effort to estimating the user and socio-economic impacts of routes. Their work presumes a description of the location and physical capacities of a set of existing and proposed routes. This route-specific approach requires much engineering design work before estimates of user and socio-economic impacts can be made. When specific routes are not important, estimating the total travel volumes of various modes within a region can be approached more simply. The purpose of this paper is to derive a model of aggregate transportation relationships within an urban region.

Burright, BK
Rand Corporation P-5108, Oct. 1973, 32 pp

ACKNOWLEDGMENT: NTIS (AD-786714/6SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-786714/6SL, DOTL NTIS

23 081948
THE IMPACT OF POLICE ACTIVITY ON SUBWAY CRIME
The impact of police manning and apprehension activities on New York City subway crime, with emphasis on robbery, is analyzed for the period 1965-1971. With increased uniformed patrol between 8 p.m. and 4 a.m., the number of felonies decreased both during the hours of increased manning (a deterrent effect) and during the rest of the day (a phantom effect). Displacement of crime is analyzed via the relationship between subway and bus robberies.

Chaiken, JM Lawless, MW Stevenson, KA
Rand Corporation P-5203, Mar. 1974, 56 pp

ACKNOWLEDGMENT: NTIS (AD-786863/1SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
AD-786863/1SL, DOTL NTIS

23 081997
BART-I: TRAVELER BEHAVIOR STUDIES. APPENDIX C. SUMMARY AND WORKING PAPERS. BAS-1 UNMET TRAVEL NEEDS STUDY
The report presents an analysis of the Bay Area survey to delineate the nature and extent of 'transportation disadvantage' in terms of the categories and location of persons who lack access to motor vehicles.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-1, Part 3, PB-236 739, and BART-2, Part 3, Volume 1, PB-236 741.

Foley, DL
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. May 1973, 118p

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236740/7ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236740/7ST, DOTL NTIS

23 265389
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. APPENDIX B. PRE-BART INTERVIEW METHOD AND DATA
The report, interim report no. 2 of the BART residential impact study, is a summary of the method and data collection for pre-BART interviews. It discusses the site-selection process and the geographic area designated for study; it presents the sampling strategy, and summarizes the data collection procedures, the type of data collected and the form, location and availability of data prior to analysis.

See also BART-2, Appendix A, PB-236 748, and BART-2, Appendix C, PB-236 750. Sponsored in part by the Department of Housing and Urban Development, Washington, D.C.

Appleyard, D Carp, F
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Intrm Rpt. No. 2, Oct. 1972, 72 pp

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236749/8ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236749/8ST, DOTL NTIS

23 265390
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. APPENDIX C. DATA DOCUMENTATION FOR THE LAND USE AND INVESTMENT STUDY
The report contains a detailed description of the data items collected as a part of the study of pre-BART property value changes (reported in Volumes I and VI of BART II, part III), and a study of office space in downtown San Francisco (Volume IV or BART II, Part III). Data descriptions include longitudinal real property sales (both residential and commercial), cross-sectional real property sales (residential), and the market street survey (commercial).

See also BART-2, Appendix B, PB-236 749. Sponsored in part by the Department of Housing and Urban Development, Washington, D.C.

Clemons, D Corpus, J
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 113 pp

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236750/6ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236750/6ST, DOTL NTIS

23 265391
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE , RETAIL SALES. PART II. VOLUME V. PREPARATION OF THE PRE-BART DATA FILE FOR THE SYSTEMWIDE SAMPLE
The report describes the data manipulation done in preparation for statistical analysis of data collected in the pre-BART responses to the environment study. The scope of the report includes data reformatting, reassignment of nonsubstantive response data, correction of errors, preparation of the data file, and data availability. Three appendices list the specific data changes that were made.

Sponsored in part by Department of Housing and Urban Develop-

ment, Washington, D.C. See also BART-2, Part 2, Volume 4, PB-236 731, and BART-2, Part 2, Volume 6, PB-236 733.

Appleyard, D
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Final Rpt. June 1973, 44 pp

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236732/4ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236732/4ST, DOTL NTIS

23 265392
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. PART III. VOLUME II. KEY INFORMANT INTERVIEWS

The report presents the results of key informant interviews with realtors, developers, bankers, and other participants in the land development process. It includes a summary and conclusions, and discussions of the development process and its participants, the interviews, methodology, and recommendations.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 3, Volume 1, PB-236 741, and BART-2, Part 3, Volume 3, PB-236 743.

Lee, DBJ
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation Final Rpt. June 1973, 85 pp

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236742/3ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236742/3ST, DOTL NTIS

23 265394
BART-II: PRE-BART STUDIES OF ENVIRONMENT, LAND USE, RETAIL SALES. APPENDIX A. STATION AND CHANNEL TYPOLOGY

The appendix, interim report no. 1 of the BART residential impact study, presents a typology which characterizes the stations and channel segments of BART according to such variables as design characteristics and land uses. Chapters include selected sites, typology characteristics, and typology matrix.

Sponsored in part by Department of Housing and Urban Development, Washington, D.C. See also BART-2, Part 4, PB-236 747, and BART-2, Appendix B, PB-236 749.

Appleyard, D Carp, F
California University, Berkeley, Metropolitan Transportation Commission, Department of Transportation, Department of Housing and Urban Development Intrm Rpt. No. 1, Aug. 1972, 52 pp

Contract DOT-OS-90023

ACKNOWLEDGMENT: NTIS (PB-236748/0ST)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236748/0ST, DOTL NTIS

24 057326
BURLINGTON NORTHERN VETERANS' ASSOCIATION
Burlington Northern predecessor companies had strong veterans groups which occupied a prominent place with their respective railroads prior to merger. Management could see veterans organizations must be a part of the merger if good employer-employee relationships were to be had. With encouragement and financial support from management, the Burlington Northern Veterans' Association membership currently is very close to 11,000 members which exceeds the total membership before merger. A strongly united veterans association of this size will prove to be a significant help in employer-employee relations.

Appeared in the proceedings of the Seventy-Seventh Annual Meeting, American Association of Railroad Superintendents, Denver, Colorado, June 21-23, 1973, and Washington, D.C., January 22-23, 1973. Entire proceedings available for $15.00.

Jones, W
American Association of Railroad Superintendents Proceeding 1974, pp 104-106

ACKNOWLEDGMENT: American Association of Railroad Superintendents
PURCHASE FROM: American Association of Railroad Superintendents 18154 Harwood Avenue, Homewood, Illinois, 60403

24 057327
EMPLOYER-EMPLOYEE RELATIONS IN THE RAILROAD INDUSTRY. PART 1
The subject of employee relations is broken down in two areas-management employees and represented employees. Five points are recommended for the management-employees case: Know what is expected, give a chance to perform, let the person know how he is doing, provide assistance as needed, and provide reward or recognition. For represented employees, proper candidate selection, in-house training, job satisfaction and fighting against regimentation which leads to loss of identity are stressed.

Appeared in the proceedings of the Seventy-Seventh Annual Meeting, American Association of Railroad Superintendents, Denver, Colorado, June 19-21, 1973, and Washington, D.C., January 22-23, 1973. Entire proceedings available for $15.00.

Powers, C
American Association of Railroad Superintendents Proceeding 1974, pp 98-103

ACKNOWLEDGMENT: American Association of Railroad Superintendents
PURCHASE FROM: American Association of Railroad Superintendents 18154 Harwood Avenue, Homewood, Illinois, 60403

24 057328
EMPLOYER-EMPLOYEE RELATIONS IN THE RAILROAD INDUSTRY. PART 2, REPORT OF COMMITTEE NO. 2
The area of employee relations is examined from two viewpoints: the first is management relations where there has been some favorable change and the second is of relations with represented employees where, unfortunately, progress has become impaired.

Appeared in the proceedings of the Seventy-Seventh Annual Meeting, American Association of Railroad Superintendents, Denver, Colorado, June 19-21, 1973 and Washington, D.C., January 22-23, 1973. Entire proceedings available for $15.00.

American Association of Railroad Superintendents Proceeding 1974, pp 133-145

ACKNOWLEDGMENT: American Association of Railroad Superintendents
PURCHASE FROM: American Association of Railroad Superintendents 18154 Harwood Avenue, Homewood, Illinois, 60403

24 057418
APPLICATION OF SCIENTIFIC-MATHEMATICAL RESEARCH TO THE DESIGN OF ROLLING STOCK MATERIAL [Applicazione della ricerca scientifica-matematica alle progettazioni dei materiale rotabile]
After a brief survey of railroad research in the past, the usefulness of the mathematical method of optimization is pointed out and the method itself, as applied in particular to route diagrams, is explained. Examples of application of the optimization method for the case of a diesel-driven train, for a vehicle with accumulators, and for an electric shuttle train are presented. [Italian]

Di Majo, F (Fiat Company, Italy) *Ingegneria Ferroviaria* Vol. 28 No. 10, Oct. 1973

ACKNOWLEDGMENT: EI (EI 74 604259)
PURCHASE FROM: ESL Repr PC, Microfilm

24 057443
RECOMMENDATION FOR THE CHICAGO AREA FREIGHT SYSTEM FOR 1995
On June 30th, 1973, the Chicago Area Transportation Study (CATS) Staff completed a draft report recommending a 1995 Transportation System for Transit, Highways, Freight, and Aviation modes. That report was titled: Functional and Intermodal Evaluation of Alternatives for a 1995 Transportation Systems in the Chicago-Gary Region. This document highlights the overall planning process leading to the recommended plan and provides an expanded version of the alternative freight plans evaluated as part of the 1995 Transportation System.

Behrens, JW Blaze, JR Corbett, RM Miller, MS
Chicago Area Transportation Study Feb. 1974, 77 pp, 16 Fig., Tabs., Apps.

ACKNOWLEDGMENT: Chicago Area Transportation Study (CATS 364-08)
PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

24 057445
THE FUTURE OF THE AMERICAN RAILROAD NETWORK
Discussion of the future of the American railroad network is both timely and difficult. In the coming months, a number of decisions, implemented by acts of Congress, will almost without doubt, make obsolete some of the observations which this, and other papers in the series, present. However, regardless of the specific actions that may be taken in the near future, there are certain general forces and trends which are basic to the prospects for American railroads.

This article appeared in Geographic Perspectives on the Future of American Railroads, Proceedings of the Special Session of the Annual Meeting of the Association of American Geographers, Atlanta, Georgia, April 1973.

Mayer, HM (Kent State University)
San Diego State University Proceeding No. 1, Apr. 1973, pp 8-22

ACKNOWLEDGMENT: Association of American Geographers
PURCHASE FROM: San Diego State University Department of Geography, San Diego, California, Repr. PC

24 057446
COMMODITY FLOW ANALYSIS. CANADIAN CARLOAD ALL-RAIL TRAFFIC 1968-1972
The data set out in this Reference Paper was derived from the computer tape records of Canadian National Railways and CP Rail and presents 119 statistical tables analyzing local (domestic, export and import) carload revenue traffic for the five years 1968-1972. Commodity groupings are as follows: (a) Statutory Grain and Grain Products; (b) Products of Agriculture (excluding Statutory Grain and Grain Products); (c) Animals and Animal Products; (d) Products of Mines; (e) Products of Forests; (f) Manufactures and Miscellaneous; and (g) Piggyback—Plan 1 (i.e., the trailers of highway transport common carriers), with the tables grouped into four sections.

Canadian Transport Commission Ref. Pap. No. 1, TT31-4/972, June 1974

ACKNOWLEDGMENT: Canadian Transport Commission
PURCHASE FROM: Canadian Transport Commission Data Base Section, 275 Slater Street, Ottawa K1A ON9, Ontario, Canada Repr. PC

24 057447
MAJOR CENTRE TRAFFIC FLOW
The movement of freight between the largest traffic centers in Canada, by commodity, number of carloads, and average length of haul, is of interest to users of transport statistics. It has been compiled from 1969 to 1972.

The "Waybill Analysis Carload All-Rail Traffic" was the basis of this study. It is a one percent sample of all domestic carload movement compiled by the Canadian Transport Commission each year and can be obtained through Information Canada.

Smith, E
Canadian Transport Commission Nos. 69, 78, 79, 80, June 1974

ACKNOWLEDGMENT: Canadian Transport Commission
PURCHASE FROM: Canadian Transport Commission Data Base Section, 275 Slater Street, Ottawa K1A ON9, Ontario, Canada Repr. PC

24 057448
DEVELOPMENT PLANNING IN THE FEDERAL RAILWAY HEADQUARTERS IN MUNICH [Entwicklungsplanung Beim Bundesbahnzentralamt Munchen]
The introduction of new technology on the modern railway calls for up-to-date planning methods. How these are instituted is described. [German]

Michelfelder, W *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 22-28, 4 Fig., 4 Ref.

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

24 057451
REVIEW OF THE DEVELOPMENT OF CYBERNETIC METHODS IN THE GERMAN FEDERAL RAILROADS AND THEIR VALUE FOR INTERNATIONAL APPLICATION [Uberblick Uber Die Entwicklung Kybernetischer Methoden Bei Der Deutschen Bundesbahn und Ihre Bedeutung Fuer Die Internationale Anwendung]
On the occasion of the 4th International Symposium for Railway Cybernetics, the program and the contributions submitted are briefly analyzed here. The Author describes the stage of development at present reached by the DB and the latest studies as a starting point for a comparison with other railways. [German]

Schmitz, W (German Federal Railway) *Eisenbahntechnische Rundschau* Vol. 23 No. 1/2, Jan. 1974, pp 34-38

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

24 057464
PRINCIPLES AND GOALS OF THE EUROPEAN INFRASTRUCTURE GUIDE PLAN [Grundlagen und Zielsetzung des Europaschen Infrastruktur-Leitplanes]
In autumn 1973 the International Union of Railways (UIC) published plans for a self-contained network of main railway lines in Europe (European infrastructure guide plan). This international plan for the railways follows similar schemes for Europe's road and inland waterway systems, and was drawn up in co-operation with experts from eleven European railway administrations under the chairmanship of the Author. [German]

Delvendahl, H (German Federal Railway) *Eisenbahntechnische Rundschau* Vol. 23 No. 3, Mar. 1974, pp 71-85

ACKNOWLEDGMENT: Eisenbahntechnische Rundschau
PURCHASE FROM: Hestra-Verlag Hernichel und Dr. Strauss, Darmstadt, West Germany Repr. PC

24 057498
CAREERS IN TRANSPORT
This issue of the monthly column presents the author's views on career employment in the railroad industry. The author presents the problems that young men will face in the railroad industry, and finally recommends that a young man go with a transport using company rather than with a railroad.

Kneiling, JG *Trains* Vol. 34 No. 10, Aug. 1974, p 5

PURCHASE FROM: Kalmbach Publishing Company 1027 North 7th Street, Milwaukee, Wisconsin, 53233 Repr. PC

24 057505
MARKETING METHODS OF THE MODERN RAILWAY
In order to survive in the face of their keen competition, the railways must nowadays pay careful attention to the conditions in the different transport markets and must continually adjust their services and charges in accordance with the market requirements. Success is to be ensured through management by marketing principles, through an efficient marketing organization, and through good initial and advanced training of the commercial staff. In recent years, most of the European railways have re-organized their sales apparatus correspondingly. The German Federal Railway is taken as an example for what, essentially, also applies to other European railways. The modern marketing activities of the railways are not intended to encroach on the valuable part played by the forwarding agents. For an effective promotion of international traffic, the marketing departments of the different railway administrations must be well attuned to each other, and their international co-operation must be intensified and speeded up. For this purpose, certain actions have already been initiated by the UIC.

Eiffler, KF (German Federal Railway) *Rail International* No. 3, Mar. 1974, pp 233-238

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

24 057507
MODAL SPLIT AS AN ESSENTIAL LINK BETWEEN LAND USE PLANNING AND TRANSPORT PLANNING
Modal split, the choice between different modes or means of transport, has nowadays become a slogan, at present especially related to the promotion of public transport. To take an influence on modal split, however, is not as simple as is often assumed. That is because the modal split depends on several, different influence factors such as the urban structure, the social importance of the transport system, the standard of living, etc. Moreover, each traffic category has its own intrinsic laws so that, even in this respect, a corresponding classification appears to be called for. In the present paper, the attempt is made, first of all, to survey the essential features under the headings of urban development, society, and space planning, and secondly, to illustrate by practical examples modal split models for different traffic categories.

Hidber, C Kobi, F (Federal Technical University, Switzerland) *Rail International* No. 3, Mar. 1974, pp 239-251, 12 Ref.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: ESL Repr. PC, Microfilm

24 057563
GEOGRAPHY OF TRANSPORTATION
A title in the Foundations of Economic Geography Series, this work reviews and analyzes "fundamental concepts that relate transportation patterns and structures to other forms of human occupance". It does not attempt to provide a synthesis of all work in a large and diverse field. Rather, it concentrates on the organization of an area as a partial function of transportation networks and systems, through an appraisal of some of the more useful models for 'real world' applications." The authors state that their book represents "a survey of some ways in which geographers have approached the study of transportation". The book's seven chapters are titled: "Transportation and Spatial Processes", "Transportation and Spatial Structure"; "The Gravity Model"; "Structural Analysis of Transportation Networks: Aggregate Measure"; "Structural Analysis of Transportation Network: Measures of Nodal Accessibility"; "Allocation Models"; and "Summary and Some Unanswered Questions". The appendix is titled "Some Statistical Considerations".

Taaffe, EJ Gauthier, HL
Prentice-Hall, Incorporated Book 1973, 226 pp, Figs., Tabs., Refs., 1 App.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: Prentice-Hall, Incorporated Route 9W, Englewood Cliffs, New Jersey, 07632 Repr. PC

24 057572
EXPERIENCE IN THE OPERATION OF A PASSENGER TRANSPORT EXECUTIVE
Four passenger transport executives have been in existence since October 1969. The Paper starts by considering the aims of the Government with

regard to urban public transport as outlined in the White Paper "Public transport and traffic" and the subsequent Transport Act 1968. It goes on to describe the experience of Tyneside Passenger Transport Exective to date in each of its main responsibilities. These are to operate those bus undertakings in the area which were formerly municipally owned, to integrate all public passenger transport in the area by means of operating and financial agreements with other bus companies and with British Railways, and to prepare and implement a plan for the future public transport system.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Ridley, TM (Tyneside Passenger Transport Executive)
Institution of Civil Engineers Proceeding 1972, pp 113-124, 9 Ref.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

24 057711
TOWARD IMPROVED RAILROAD SERVICE-A REALISTIC APPROACH
This essay discusses some of the present problems with railway service and offers several proposals to improve the railway system. By the 1980's the demand for railway service will double. To meet this commitment railways will have to consider electrification, new car designs, more efficient work rules and improved management services.

Humbert, JC (Illinois Central Gulf Railroad) *Progressive Railroading* Vol. 17 No. 7, July 1974, pp 29-33

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

24 057713
CAN THEY OWN IT AND RUN IT TOO?
In 1972 a group of officers and employees of the Chicago and Northwestern Railroad purchased the railway from its former owners. Since then traffic and revenues have increased substantially. Employee relations were good before the railway was purchased but since then even more emphasis has been placed on a good working environment. As an indication of the company's attitude to the future, a $100 million capital spending budget is planned for 1974.

Shedd, T *Modern Railroads* Vol. 29 No. 7, July 1974, pp 54-57

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

24 057723
GERMAN FEDERAL RAILWAY PLANS FOR EXTENDING AND REMODELLING ITS NETWORK FOR 200 KM/H AND ABOVE
Speeds of 200 to 300 km/h demand more direct routes which entail some 950 km of new lines and 1,250 km of remodelling of existing network to provide the Federal Republic with a service that it needs for the years to come and still fulfilling DB's international commitments as a strategically-placed railway system. Investments totalling some DM 40 million are envisaged by 1985.

Kalb, H (German Federal Railway) *Rail Engineering International* Vol. 4 No. 5, June 1974, p 209

PURCHASE FROM: ESL Repr. PC, Microfilm

24 057743
THE RAILROADS ARE GETTING ON SCHEDULE
While railroad productivity has been gaining, there are still many problems associated with traffic growth. Car supply is complicated by the large number of cars which are out of service and problems associated with getting materials for new cars. However, there is optimism on the part of industry executives and in the railway supply industry.

Iron Age Vol. 214 No. 6, Aug. 1974, pp 31-33, 1 Fig., 2 Phot.

PURCHASE FROM: ESL Repr. PC, Microfilm

24 057876
REMEDIES FOR THE RAILROADS
As the Administration and Congress have joined in a rush to revitalize the railroads, particularly in the financially stricken Northeast, the Construction Aggregates Rail Shippers Conference is convinced that the national rail system will be more efficiently run and operated as a private enterprise. Of particular concern to cement and aggregates shippers are rates, equipment, unit train services and intermodal systems. All these require carrier and shipper cooperation.

Stearn, EW *Rock Products* Vol. 77 No. 8, Aug. 1974, pp 54-58

ACKNOWLEDGMENT: Rock Products
PURCHASE FROM: University Microfilms 313 North 1st Street, Ann Arbor, Michigan, 48103 Repr. PC

24 071965
AN ANALYSIS OF THE JOB OF RAILROAD TRAIN DISPATCHER
The report constitutes a detailed study of the job of railroad train dispatcher, conducted to provide a data base for the derivation of job knowledge, skills and training consonant with safe operations. Documentation was reviewed: specialists were consulted, and selected dispatching operations were observed in detail. The report describes the responsibilities and duties of train dispatchers, their workplaces and job aids, the principal functions they perform, and the records they must maintain. Special characteristics of the job, such as workload, stress, inadequacies in aids, and trends toward improvements are discussed, and estimates are made of the physical and psychological attributes, job knowledge and skills basic to safe operations and possible approaches to assurance of safety through selection, placement and training.

Devoe, DV
Transportation Systems Center, (DOT- TSC- FRA-73-13) Final Rpt FRA- ORD/D-74-37, Apr. 1974, 263 pp

ACKNOWLEDGMENT: FRA (PB-233 597/4)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-233 597/4, DOTL NTIS

24 072039
ENLARGED MEETING OF THE MANAGEMENT COMMITTEE OF THE AICCF [Reunion elargie du comite de gestion de l'AICCF]
A set of five borchures describes ITEP, the Institute of Transportation of the Swiss Federal Institute of Technology in Lausanne (EPF-L). It is one of four institutes within the civil engineering department. There is a staff of six, engaged in Teaching, and theoretical and applied research. Students must have prior knowledge of Rural Engineering, Civil Engineering and Architecture. Research programs fall into four categories: (1) Transportation planning. Ex: case studies involving dynamic analysis and choice evaluation. (2) Network and terminal design and operations. Ex: simulation study of the carrying capacity of a railroad track. (3) Transportation economics and management. Ex: track maintenance and renewal. (4) Computer applications. Ex: choice of investments from the viewpoints of industrial and welfare economics. [French]

Institute de Technique des Transports 1973, 22 pp, 26 Fig., 1 Tab.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Institute de Technique des Transports 1006 Lawsanne, Switzerland Repr. PC

24 072464
THE CASE OF THE THREE ENGINEERS VS. BART
This article is intended to focus on the complexities of ethics and employment practices, not on the technical aspect of the Bay Area Rapid Transit system. Nevertheless, the two are related, so some of BART's history, as it is perceived by those interviewed, is included. A lawsuit was recently filed against BART by three of its former engineer-employees. As early as 1971 the three became concerned with the design of the system's Automatic Train control. These engineer's fears eventually became public and all three were fired. BART management apparently felt its three critics had made disclosures as the bugs were in the process of being worked out and such disclosures were unethical. The article is of special interest to engineering practioners.

Friedlander, GD *IEEE Spectrum* Vol. 11 No. 10, Oct. 1974, pp 69-76

PURCHASE FROM: ESL Repr PC, Microfilm

24 072590
CONTINUING EDUCATION
This report analyzed the professional technical personnel employed by railroads and discusses why continuing education may be needed by engineers. It goes on to suggest the ways in which advanced technical education may be achieved.

Also available through Engineering Societies Library.

AREA Bulletin Proceeding Vol. 76 Bulletin 649, Sept. 1974, pp 125-136

ACKNOWLEDGMENT: AREA Bulletin
PURCHASE FROM: AREA Repr. PC

24 072716
SERVICE CHARACTERISTICS OF AN INTERSTATE RAIL NETWORK
The central thesis of this paper is that the U.S. rail system can provide a much higher level of service than that which is currently prevalent. It is proposed that railroads endeavor to create an integrated Interstate Rail Network, a system of high-capacity yards connected by well-maintained mainlines which would allow railroads to develop a competitive route structure consistent with the changing service needs of the U.S. economy.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Martland, CD (Massachusetts Institute of Technology)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 34-39, 1 Fig., 5 Tab., 11 Ref.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

24 072717
TOWARDS A NATIONAL POLICY OF SUPER RAILROADS
After describing some of the national rail restructuring proposals, and noting that most of them originated outside the industry, the author describes the Chicago Area Transportation Study. He notes that while previous restructuring plans have had a premise of creating balanced rail companies, this proposal concentrated on the need to rationalize right-of-way and terminals without great consideration for ownership. The resulting Midwestern High Speed Rail Freight Network would be an interstate railway system much like the interstate highway system. The author concludes that only federal and state governments can serve as the catalyst for reorganization of the railroad system, acting as referee, advisor and financial backer.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Blaze, JR (Chicago Area Transportation Study)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 26-33, 5 Tab.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

24 072718
HOW TO DETERMINE THE OPTIMUM RAILROAD ROUTE STRUCTURE?
This paper, says the author, presents no original research and no answers. Instead, it raises questions about "route structure," a term common in airline planning, but not in railroading. The questions fall into four major categories: Can national interest, distinct from regional or local interest, be defined? Is intramodal competition desirable or wasteful? What is the optimum extent of a system? What can be learned from experience in other nations and other modes?

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Bixler, HE
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 23-24

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

24 072719
BALKANIZATION IN THE RAILROAD INDUSTRY
Balkanization prevades almost every aspect of railroading, according to the author. Individual managements seem to regard other railroads as their most dangerous rivals; it is tragic that the railroad industry, which faces acute external challenges to its survival, should be caught up in diverting, divisive and destructive interrailroad competition. Managers have little time or incentive to work on problems and opportuities that are industry-wide in character. While suggesting that industry leadership might change this, the author proposes a restructuring of U.S. rail lines into four or five systems, all of which would serve most major metropolitan areas.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Morton, AL (Harvard Business School)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 14-17

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

24 072977
THE ROLE OF ELECTRONIC COMPUTERS USED IN MARSHALLING YARDS IN THE CENTRALISED MANAGEMENT OF GOODS TRAFFIC ON THE S.N.C.B. [Le role des calculateurs electroniques des gares triages dans la gestion centralisee du traffic des marchandises de al S.N.C.B.]
The above article is limited to an explanation of the manner in which the S.N.C.B. proposes to introduce modern methods of management into the "operating" sub-section, and describes the initial practical experiments carried out. After having explained the general organization of the "operating" sub-section, the author examines the technical equipment used in the different yards (loading and unloading depots, and marshalling and train-formation yards), and provides a description of the computers used in marshalling yards, together with details of their characteristics; he then explains fully the part played by computers in the organization of these yards, as well as the arrangements made in order to ensure the dependability of the system. Finally, he reaches conclusions in regard to the introduction of the centralized management of goods traffic on the S.N.C.B. [French]

Gochet, M *International Railway Congress Assn Monthly Bull* No. 2, 1969, pp 35-60, 15 Fig., 3 Tab.

ACKNOWLEDGMENT: AAR (657)
PURCHASE FROM: ESL Repr. PC, Microfilm

24 080066
NEW METHODS IN CONSTRUCTION SYSTEMS
Contemporary computer applications make it possible to assemble construction resource planning data and to present this information to a variety of users. Estimating and scheduling are interdependent functions of construction planning. Adequate planning requires detailed construction cost estimates which have been converted to time-dependent models by allocation of resources to activities. Computer printouts, in both tabular and graphic forms, isolate anomalies and provide a basis for redistribution of resources. From the assembled data, histograms representing resource demand models can be compiled. When two of these resource histograms are compared mathematically, useful effectiveness ratios can be devised, such as man-hours per ton of reinforcing steel. Such planning data can be compared to on-the-job experience in order to evaluate project management.

Presented at the ASCE National Water Resources Meeting, Los Angeles, California, January 21-25, 1974.

LeVitt, RR (Mathews (AA), Incorporated) *ASCE Journal of the Construction Division* Vol. 1005 No. CO3, Proc. Paper #10788, Sept. 1974, pp 211-222

ACKNOWLEDGMENT: ASCE Journal of the Construction Division
PURCHASE FROM: ESL Repr. PC, Microfilm

24 080067
NETWORK ANALYSIS AND CONSTRUCTION PLANNING
The inadequacy of network analysis and resource allocation techniques in producing a workable schedule for site management is examined in relation to the basic principles of planning the construction process. Choice of the critical production line, in terms of cost calculations or limited resources, must be one of the first steps. The rate of progress of all other production lines must be adjusted to the line so chosen. Distinction is called for in the planning procedure between four different categories of activities, according to their influence on the production process. Since for the bulk of the activities in construction duration is a function of the crew size, balancing of the whole construction process into a comprehensive system of production necessitates planning techniques based on an input of fundamental production data, e.g., quantities of work, production rates, and other production characteristics.

Peer, S (Technion-Israel Institute of Technology) *ASCE Journal of the Construction Division* Vol. 100 No. CO3, Proc. Paper #10792, Sept. 1974, pp 203-210

ACKNOWLEDGMENT: ASCE Journal of the Construction Division
PURCHASE FROM: ESL Repr. PC, Microfilm

24 080068
NETWORK METHODS FOR PROJECT PLANNING AND CONTROL
A synthesis of current ideas, research trends, and findings is made on some of the better known and other newly developed networking techniques for project management. Using Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) ad a basis of comparison, methods such as Decision Critical Path Method (DCPM), linear flow graphs, and Graphical Evaluation and Review Technique (GERT) are introduced and examined in the light of their application to construction projects. Salient similarities and differences among these methods as well as the capabilities and limitations of each are pointed out. Sufficient information on the mathematical algorithms used in the newer techniques previously mentioned and the necessary steps to use them are provided. Finally, examples of application to civil engineering problems illustrating the use of each method are presented.

Naaman, AE (Illinois University, Chicago) *ASCE Journal of the Construction Division* Vol. 100 No. CO3, Proc. Paper #10814, Sept. 1974, pp 357-372, 7 Fig., 1 Tab., 30 Ref., 3 App.

ACKNOWLEDGMENT: ASCE Journal of the Construction Division
PURCHASE FROM: ESL Repr. PC, Microfilm

24 080108
COMPENSATION OF INDUSTRIAL ENGINEERS
This extensive salary survey, taken during the first half of 1973, was designed and conducted by Abbott, Langer & Assoc., Chicago-based consultants in personnel management and industrial psychology. According to AIIE, the resultant data represent 43.4 percent of its current membership and achieve a high correlation with its national geographic membership patterns, thus projecting an extremely accurate picture of the IE salary pattern as it exists today. The survey examines in detail seven variables affecting annual income: level of academic degree, job level held, age of respondent, length of professional experience, geopraphic area in which employed, type of employed by SIC code, and size of responsent's organization in terms of number employed. The effect of degree level and job level, taken together, are further analyzed in relation to each of the other five variables reported. In all cases, survey procedures provided for reporting of mean and median income, along with the standard deviation.

American Institute of Industrial Engineers 1972, 87 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: American Institute of Industrial Engineers 25 Technology Park/Atlanta, Norcross, Georgia, 30071 Orig. PC

24 080215
MASS TRANSIT TRAINING NEEDS. VOLUME I. EXECUTIVE SUMMARY
The report is the first of a five-volume series summarizing the findings, conclusions, and recommendations of a study of urban mass transit training needs. This study includes a detailed analysis of the training requirements; a discussion of the availability of training programs to meet the needs of the industry; an outline of supplementary material needed to bring training programs up to an acceptable standard; and proposals for programs to upgrade the standard of training as it currently exists. Specifically, this volume summarizes the results of an inquiry into industry needs for standardized programs regarding training of (1) bus operators, (2) bus operator instructors, (3) bus mechanics, (4) bus mechanic instructors, and (5) rapid transit rail car repairmen. Following a description of programs currently in use at transit properties, the general contents of the respective standardized programs are outlined, the role of the Federal government in funding is examined, alternative methods of delivering programs are discussed, and costs of development and demonstration are estimated.

Thrasher, EJ Wood, P
Mitre Corporation, Urban Mass Transportation Administration, (UMTA-VA-06-0004) Tech. Rpt. MTR-6681-Vol-1, May 1974, 42 pp

Contract DOT-UT-10005

ACKNOWLEDGMENT: NTIS (PB-236000/6SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236000/6SL, DOTL NTIS

24 080216
MASS TRANSIT TRAINING NEEDS. VOLUME II. HISTORY AND METHODOLOGY
The report is the second volume of a five-volume series summarizing the findings, conclusions, and recommendations of a study of urban mass transit training needs. This volume describes the history and methodology of the program. Statistics relating to transit industry training are derived.

Thrasher, EJ Wood, P
Mitre Corporation, Urban Mass Transportation Administration, (UMTA-VA-06-0004) Tech. Rpt. MTR-6681-Vol-2, June 1974, 104 pp

Contract DOT-UT-10005

ACKNOWLEDGMENT: NTIS (PB-236001/4SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236001/4SL, DOTL NTIS

24 080217
MASS TRANSIT TRAINING NEEDS. VOLUME V. RAILCAR REPAIRMAN TRAINING NEEDS
The report is the fifth of a five-volume series summarizing the findings, conclusions, and recommendations of a study of urban mass transit training needs. This volume is devoted to the railcar repairman. About half of the training is generalized enough to allow a standardized training course to be developed. An outline of such a course, and sources of training material which would be included are presented. One conclusion is that because of the financial difficulties of the mass transit industry, it is recommended that implementation be delayed until funds become available to cover the costs of training.

Wood, P
Mitre Corporation, Urban Mass Transportation Administration, (UMTA-VA-06-0004) Tech. Rpt. MTR-6681-Vol-5, Aug. 1974, 53 pp

Contract DOT-UT-10005

ACKNOWLEDGMENT: NTIS (PB-236004/8SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-236004/8SL, DOTL NTIS

24 080253
SHORT LINE TECHNIQUES TO IMPROVE FINANCIAL VIABILITY OF LIGHT DENSITY LINES. MAJOR RAILROADS
Investigation was made to determine the extent to which the operating and management techniques employed by short lines could be applied to improve the financial viability of Class I railroad branch lines either through adaptation or conversion of branch to short lines. Pertinent literature was analyzed and extensive field studies of six branch and six comparable short lines were undertaken. Data and information were evaluated and these indicated that the financial posture of branch lines could be improved if certain short line operating and marketing practices were utilized on branch lines.

Banks (RL) and Associates, Incorporated, Federal Railroad Administration May 1974, 190 pp

Contract DOT-FR-30042

ACKNOWLEDGMENT: NTIS (PB-235389/4)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-235389/4, DOTL NTIS

24 080464
IMPROVING RAILROAD RELIABILITY: A CASE STUDY OF THE SOUTHERN RAILWAY. EXECUTIVE SUMMARY STUDIES IN RAILROAD OPERATIONS AND ECONOMICS. VOLUME 11
This report summarizes the results of the second phase of research conducted by the Massachusetts Institute of Technology for FRA. An in-depth case study of the operations of Southern Railway verified previous research conclusions and suggested strategies for a test program for improving reliability. Results of the test, analyzed by Southern and MIT after its implementation, show both reliability and mean trip times can be improved in the short run without increasing costs. It is suggested other railroads can develop similar programs for improving reliability. Top managements must specify reliability service as a major corporate goal, have lines of effective communication and establish a mid-management interdepartmental planning unit.

This report was prepared by the Federal Railroad Administration, Department of Transportation.

Sussman, JM Martland, CD
Massachusetts Institute of Technology Final Rpt. R-74-29, Mar. 1974, 24 pp, 1 Tab.

ACKNOWLEDGMENT: Massachusetts Institute of Technology
PURCHASE FROM: Massachusetts Institute of Technology Department of Civil Engineering, Cambridge, Massachusetts, 02139 Repr. PC

24 080465
RELIABILITY IN RAILROAD OPERATIONS: EXECUTIVE SUMMARY. STUDIES IN RAILROAD OPERATION AND ECONOMICS. VOLUME 9
Staring in February 1971, Massachusetts Institute of Technology conducted a study of rail freight service reliability for FRA. With the assistance of eight major railroad, MIT first established measures of reliability, quantified current railroad performance and isolated some of the causes of unreliability. The conclusions of this phase are that unreliability does exist, that the problems are in yards, that unreliability can be improved in the short run by changes in rail operations and that a dialogue with shippers is critical.

Sussman, JM Martland, CD Lang, AS
Massachusetts Institute of Technology R73-4, Dec. 1972, 23 pp, 1 Fig., 1 Tab., 9 Ref.

ACKNOWLEDGMENT: Massachusetts Institute of Technology
PURCHASE FROM: Massachusetts Institute of Technology Department of Civil Engineering, Cambridge, Massachusetts, 02139 Repr. PC

24 080467
RAILROAD DIVERSIFICATION: WHERE LIES THE PUBLIC INTEREST
The potential public benefits and costs of railroad diversification are examined in this article. The principal claimed benefit, that diversification will produce an increased flow of capital to the railroad industry, is unlikely to be realized. The principal cost, that management may use diversification as a means of transferring assets from railroading to other more profitable lines of business, is less a problem created by diversification than a reflection of the current financial state of the railroad industry. Railroad diversification should be neither banned nor tightly regulated. Either will further hamper a much needed process of adjustment that already has been to long delayed. Instead, diversification ought to be welcomed, for it will place a needed check on the ICC's ability to force railroads to operate in a noneconomic fashion. /Author/

Eads, GC *Bell Journal of Economics and Management Science* Vol. 5 No. 2, Sept. 1974, pp 595-613, 26 Ref.

ACKNOWLEDGMENT: Bell Journal of Economics and Management Science
PURCHASE FROM: ESL Repr. PC, Microfilm

24 080766
THE GREAT RAILROAD ROBBERY: DISINVESTMENT
Diversification into non-transportation areas was considered a way of strengthening the parent railroad. However, during the last decade, it has become apparent that diversification has become a conglomeration and the parent railroad has become a subsidiary. As the railways are divested of their assets it becomes increasingly hard to raise capital for needed improvements such as equipment, track improvements, etc. At least fourteen major railroads are now controlled by holding companies.

Modern Railroads Vol. 29 No. 9, Sept. 1974, pp 67-72

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

24 080777
MARKETING HIGH SPEED GROUND TRANSPORT
This paper outlines the major problems and decisions that must be considered in developing a successful marketing program for a high speed ground transport system. Each of the major elements of an integrated transport marketing program is considered: product-policy; pricing structure and strategy; selection of marketing channels; and choice of promotional media. In addition, the paper examines some of the special problems encountered in conducting market research when the product under study involves transport services. Finally, the paper explores several of the problems and issues involved in attempting to develop an effective transport marketing program under government regulatory constraints.

Hooper, TJ Johnston, EE (Canadian Transport Commission) *High Speed Ground Transportation Journal* Vol. 8 No. 3, 1974, pp 275-282, 1 Tab., 6 Ref.

ACKNOWLEDGMENT: High Speed Ground Transportation Journal
PURCHASE FROM: ESL Repr. PC, Microfilm

24 080791
RAILROADS MOUNT WIDENING R&D ATTACK IN 12 KEY PROBLEM AREAS
The evolution of the industry's Research and Development effort since 1970 is described. During this time there has been a tripling of funding for the AAR activities and this group, individual railroads, government and railway suppliers have all assumed new roles. The AAR is directing its R&D effort at a dozen areas: Improved coupling, nondestructive testing, equipment design, wheel/rail contact stresses, freight-car trucks, track structure, locomotive cab improvements, electrification, car information and management, automatic car identification, improved car utilization, and improved marketing-study methods. Special attention is given to the cooperative track/train dynamics investigation.

Welty, G *Railway Age* Vol. 175 No. 18, Sept. 1974, pp 20-24, 10 Phot.

PURCHASE FROM: XUM Repr. PC

24 081205
MULTIDISCIPLINARY EDUCATION IN TRANSPORTATION
This report includes papers presented during the Conference on Multidisciplinary Education in Transportation sponsored by the Highway Research Board and by the Transportation Studies Center of the University of Pennsylvania. Ten papers discuss the issues and problems facing transportation educators. Conclusions of the Conference: A new profession and discipline are in existence today; efforts in transportation education have not reached any level that satisfies professionals and educators; the perplexity and ambivalence that characterize transportation are also manifested in educational efforts in the field; the two branches of transportation (engineering and social sciences) are not compatible; institutions of higher learning have not been convinced that transportation should have special advantage over any other multidisciplinary field.

Transportation Research Board Special Reports No. 150, 1974, 58 pp, 2 Fig., 2 Tab., 8 Ref.

PURCHASE FROM: TRB Repr. PC

24 081384
COLLECTIVE BARGAINING AND TECHNOLOGICAL CHANGE IN AMERICAN TRANSPORTATION
The authors have attempted to show the differences in the impact of technology among transportation industry subsectors, the significance of institutional arrangements and the workability of collective bargaining under difficult circumstances. In addressing the problem of whether employment

problems generated by technological change can be resolved through collective bargaining, each author deals with a different segment of transportation. The result is generally similar treatment of what has occurred in trucking, railroading, the maritime industry, and the airline flight deck. The generally quiet bargaining of trucking contrasts sharply with the stormy experience in the railroad and maritime industries with their economically troubled companies, technical innovation, and numerous craft unions bargaining individually.

Levinson, HM Rehmus, CM Goldberg, JP Kahn, ML
Northwestern University, Evanston 1971, 723 pp

PURCHASE FROM: Northwestern University, Evanston Transportation Center Library, Evanston, Illinois, 60201 Orig. PC

25 057330
WHICH WEIGHS MORE—A TON OF GRAVEL OR A TON OF RADIOS?
One of the many economic factors ignored by the ICC is the fact that each mode of transportation enjoys certain inherent cost advantages for different items of carriage in different situations. Railroad rates are higher when no barge competition is available. As a result, industries locate near water routes, with subsequent water quality problems. Canals are sometimes built, causing further environmental disruption. Value of service rate discrimination may raise prices of recyclable scrap. ICC policies with environmental implications are reviewed.

Conroy, J *Environmental Action* Vol. 5 No. 10, Sept. 1973, pp 9-11, 2 Phot.

PURCHASE FROM: Environmental Action Incorporated 1346 Connecticut Avenue, NW, Room 741, Washington, D.C., 20036 Repr. PC

25 057484
BUT IT'LL SAVE $30 MILLION
Plant rationalization is at the core of DOT's recommendations for the future of railroading in the Northeast. The Secretary suggests that twenty-five percent of the region's railroad route mileage is unnecessary either because it is uneconomic or redundant. However, if some trackage is abandoned, it will increase the load on other yards that may not be able to handle the traffic. In addition, the increased route length to some places will increase operating and maintenance costs and decrease the service that a railroad can offer a shipper. Several studies have indicated that abandoning even relatively low density routes may not save the railroad any money. Thus, several organizations believe that rail rationalization cannot revitalize the Northeast railroads.

Meislahn, HS *Modern Railroads* Vol. 29 No. 6, June 1974, pp 56-59

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

25 057488
THE NEW "ACT"
The article discusses the contents of the Regional Rail Reorganization Act of 1973. The most important feature of the proposed act is the Consolidated Rail Corporation which will be established to operate the railways that come under the authority of the act.

Progressive Railroading Vol. 17 No. 2, Feb. 1974, pp 13-15

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

25 057491
EUROPE PLANS ITS "RAILROAD OF THE FUTURE"
For the first time, Europe is planning an integrated railway system that, by 1985, will interconnect all centers of continental importance. The system will be qualitatively and quantitatively competitive with other transportation modes. The system will consist of 3,600 miles of new track and 8,450 miles of modernized existing track. When completed, the project will cost $13 billion. The Master Plan has been prepared by the International Union of Railways.

Progressive Railroading Vol. 17 No. 3, Mar. 1974, pp 56-58

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Murphy-Richter Publishing Company 9 South Clinton Street, Chicago, Illinois, 60606 Repr. PC

25 057531
AMERICA'S ROADS: PRESENT CONDITION—FUTURE PROSPECTS
This paper gives what might be called a truckers' view of railroad problems and government policies and regulations relating to railroads.

Prepared periodically by Department of Research and Transport Economics.

Truck Beat Vol. 19 No. 2, June 1974, 13 pp, 3 Tab.

PURCHASE FROM: American Trucking Associations 1616 P Street, NW, Washington, D.C., 20036 Repr. PC

25 057532
THE SHIPPER VIEWS PROPOSED SOLUTIONS TO THE NORTHEAST RAILROAD PROBLEM
Questionnaires were mailed to selected participants in this survey. One half of the questionnaires were sent to shipper executives who were selected at random. The other questionnaires were mailed to non-transportation executives who were the presidents of their respective companies. The responses received reflect the opinions of those who responded and constitute valuable information relative to the shipper's views on the northeast railroad problem. The nonnarrative information from the returned forms was then computer analyzed using the Statistical Package for the Social Sciences and this paper summarizes some of the more interesting findings from the survey.

Johnson, JC (Tulsa University); Harper, DV (Minnesota University) *Transportation Journal* Vol. 13 No. 4, June 1974, pp 5-13, Refs.

ACKNOWLEDGMENT: Transportation Journal
PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Repr. PC

25 057533
RESEARCH NOTE: ANALYSIS AND DEMAND IMPLICATIONS OF THE RAPID TRANSIT VOTE IN ATLANTA
In November 1971 the voters of two metropolitan Atlanta counties agreed to build a rail based rapid transit system, to levy an incremental one cent sales tax to defray the operating costs of the system, and to impose a 15¢ fare on all public rapid transit modes for the next 8 years. Some questions are raised concerning the demand conditions facing the future rail transit system. The purpose of this paper is to analyze the "Yes" vote in Fulton County and from the analysis suggest some marketing problems that rapid rail transit is likely to face.

Neidell, LA (Georgia Institute of Technology) *Transportation Journal* Vol. 13 No. 4, June 1974, pp 14-18, 3 Tab., 3 Ref.

ACKNOWLEDGMENT: Transportation Journal
PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Repr. PC

25 057534
SECTION 22: PANACEA OR PARASITE
Section 22 of the Interstate Commerce Act allows, but does not require, the transportation of persons or property at reduced or free rates for governmental organizations and a substantial number of other organizations or classes of persons. This provision of the I.C. Act has recently come into the limelight because of the proposed Surface Transportation Act, which would drastically curtail the use of Section 22. The purpose of this paper is to survey this provision briefly, with special emphasis on the current positions of transport, government, and other organizations regarding the continuation of Section 22 in its present form. The paper concludes with the author's proposed solution to this quandary.

Johnson, JC (Tulsa University) *Transportation Journal* Vol. 13 No. 4, June 1974, pp 34-40, 1 Tab., Refs.

ACKNOWLEDGMENT: Transportation Journal
PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Repr. PC

25 057560
RAILWAYS IN THE 70'S
In the recent past, railways have often been presented, and have often been accepted by the public, as an industry inevitably in decline. While newer and faster motor cars and aircraft have appeared in endless succession, and the motorway and airline systems have developed, railways seemed to have made few technical advances, and, with the system neglected and starved of capital for so long it was not suprising that their image was a poor one. The success of the inter-city train shows that railways can provide profitable services of a high standard. They cannot maintain that image and make the needed improvements in other services unless they have financial backing from government transport departments. This informed, objective and revealing study proves the point.

Caton, MPL Stanley, JM
Railway Invigoration Society Feb. 1973, 24 pp, Phots.

ACKNOWLEDGMENT: Railway Invigoration Society
PURCHASE FROM: Railway Invigoration Society, Secretary BM/RIS, London WC1V 6XX, England Repr. PC

25 057570
TRANSPORT ASPECTS OF THE PREPARATION OF THE STRATEGIC PLAN FOR THE SOUTH EAST
The Paper summarizes the terms of reference of the Joint Planning Study and describes the role of the transport work in the light of those terms. The objectives of the transport work are set out. The Paper considers the timetable of the study and the problems posed by it in relation to the availability of data upon which to found the transport analysis. Reference is made of the overall framework of evaluation used in the study. The framework of transport assessment is described and a comparison made between this framework and the original objectives. The models used to forecast traffic flows on the road and rail networks in the region are also described.

Articles from Transportation Engineering 1972, Proceedings of the conference organized by the Institution of Civil Engineers in London, 18-21 April 1972.

Wilson, RL Holland, CT (Travers Morgan and Partners)
Institution of Civil Engineers Proceeding 1972, pp 45-48, 9 Fig.

ACKNOWLEDGMENT: Institution of Civil Engineers
PURCHASE FROM: ESL Repr. PC, Microfilm

25 057717
ICC BEHAVIOR ON RAIL ABANDONMENTS
Rail management is not free to determine whether it can cease operations over certain parts of its plant. Rather such management decisions are subject to the approval of a Federal regulatory agency, The Interstate Commerce Commission (ICC). The ICC, in turn, trades off the carrier's desires with those of the public who may be adversely affected by the proposed abandonment of service. The nature of the trade off made by the ICC is explored through a theoretical model of the Commission's behavior. This behavioral theory gives an a priori construct from which empirical tests of actual Commission abandonment decisions are conducted. A (O, 1) grant-deny decision model is postulated and estimated as a linear probability model, as a discriminant model, and as a probit model. All independent variables have the correct signs. In addition, the models classify existing cases properly at the 95% level. The empirical model suggests that Commission decisions are ordered and follow a well defined pattern.

Allen, WB (Pennsylvania University, Philadelphia) *ICC Practioners' Journal* Vol. 41 No. 5, July 1974, pp 553-571

ACKNOWLEDGMENT: ICC Practitioners' Journal
PURCHASE FROM: Association Interstate Commerce Comm Practitioner 1112 ICC Building, Washington, D.C., 20423 Repr. PC

25 057718
SOUTH DAKOTA TASK FORCE ON RAILROAD ABANDONMENT POLICY
This interim report, prepared as the basis for recommendations for consideration by the 1974 state legislature, describes the development of the South Dakota railroads and, while noting that most of the corrective measures must deal with the rail industry as a whole and at the Federal level, does detail specific ways that the state can assist its railroads to better fill their vital role in its economy.

South Dakota Department of Transportation Intrm Rpt. June 1974, 15 pp, Figs., Tabs.

PURCHASE FROM: South Dakota Department of Transportation Highway Building #1, Pierre, South Dakota, 57501 Repr. PC

25 057814
MEASURING THE EFFECTIVENESS OF LOCAL GOVERNMENT SERVICES: TRANSPORTATION
A consumer-oriented approach is made to assessing the quality of local transportation. The authors propose a system that local governments may use to estimate how well their transportation-related services are serving their citizens. Twelve specific measures of effectiveness, keyed to such broad goals as accessibility, convenience, travel time, safety, and maintenance of environmental quality, are proposed. Ways to collect and analyze the necessary data are indicated. Summary recommendations and cost estimates for carrying out the measurement system are provided.

Library of Congress Catalog Card no. 72-95475.

Winnie, RE Hatry, HP
Urban Institute, (UI-127-201-2) ISBN-8776-038-7, 1972, 92 pp

Contract HUD-H-990

ACKNOWLEDGMENT: NTIS (PB-233390/4)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-233390/4, DOTL NTIS

25 071617
1972 NATIONAL TRANSPORTATION REPORT
This report presents a comprehensive picture of transportation in the U.S., and a future outlook for it. The report covers all modes, and has sections on the capital needs of railroads, rail freight services, rail passenger services, and urban rapid transit.

The 1974 edition should be available in late 1974 or early 1975.

Office of the Secretary of Transportation 1972, 437 pp, Figs., Tabs.

PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Repr. PC

GPO 5000-00058, DOTL RP

25 071622
REPORT ON JOINT CONFERENCE ENO FOUNDATION BOARD OF DIRECTORS AND BOARD OF CONSULTANTS NOVEMBER 7 AND 8, 1973
This two-part report, summaries of panel discussions, deals with Trends in Transportation Policy and then with Issues in Transportation Development. Transportation accounts for 20% of the Gross National Product of the U.S. and about 55% of the transportation portion involves passenger movement (by all modes, including the private automobile). The changing involvment of government is covered in its various facets with particular attention given to railroad and transit problems.

Traffic Quarterly Vol. 28 No. 3, July 1974, pp 325-370

PURCHASE FROM: Eno Foundation for Transportation, Incorporated P.O. Box 55, Saugatuck Station, Westport, Connecticut, 06880 Repr. PC

25 071626
ISSUES IN STATEWIDE TRANSPORTATION PLANNING
State governments currently have an intense interest in statewide transportation planning and approximately 25 of them have state departments of transportation. Because of the financial difficulties of many transportation modes and the essential nature of transportation in support of the economy and in community viability, the states, local governments and private industry must consider what actions are required to preserve vital transport services. DOT requested the Transportation Research Board to conduct a study conference on statewide transportation planning. This report contains the proceedings of the conference.

This is a report of a conference held in Williamsburg, Virginia, 21-24 February 1974.

Transportation Research Board Special Reports No. 146, 1974, 262 pp, Figs., Tabs., Refs.

PURCHASE FROM: TRB Repr. PC

25 071744
MEASUREMENT AND EVALUATION OF TRANSPORTATION SYSTEM EFFECTIVENESS
The report discusses primarily work on the following topics: (1) Identification, hierarchical structuring, definition and measurement of individual attributes contributing to the overall effectiveness of transportation system; and (2) Methodology for aggregating or combining and value derived from individual attributes to arrive at measures of aggregate incremental benefit (this involves research on query techniques as well as extensions in the application of utility theory). (Author)

Pardee, FS Kirkwood, TF Kraemer, KL MacCrimmon, KR Miller, JR, III
Rand Corporation RM-5869-DOT, Sept. 1969, 470 pp

Contract DOT-FR-9-0054

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC

PB-185711, DOTL NTIS

25 071763
THE TRAIN THAT RAN AWAY
This book is a business history of British Railways for the years 1948-1968. The book looks at the problems that faced the newly nationalized (1948) British Railways. The book also looks critically at management policies that poured capital into the existing system rather than rationalizing it to adjust it ot the needs of the postwar society.

Joy, S
Allan (Ian) Limited 1973, 160 pp

PURCHASE FROM: Allan (Ian) Limited Terminal House, Shepperton TW17 8AS, Middlesex, England Repr. PC

25 071788
DECISION MAKING PROCESSES GOVERNING FEDERAL EXPENDITURES WITHIN THE TRANSPORTATION SECTOR OF THE UNITED STATES
Federal allocations for highways, waterways, and maritime subsidies are declining relative to urban public transit, and Coast Guard navigation related expenditures. Environmental considerations and obvious failure in the case of maritime subsidies appear to be the major reasons. Airport and airway allocations will be subject to the same negative forces. The next massive transportation program to appear in the federal budget other than urban public transit is likely to involve the national railway system. The big question here is how the money will be handed out. Economists and planners so far appear to have had little interest or impact in this difficult and crucial area of public decision making.

Burns, RE (Department of Transportation) *Transportation* Vol. 3 No. 2, July 1974, pp 147-164, 5 Ref

ACKNOWLEDGMENT: EI (EI 74 802721)
PURCHASE FROM: ESL Repr PC, Microfilm

25 071837
A UNITED STATES RAIL TRUST FUND; PRESCRIPTION FOR MODERN RAIL TRANSPORTATION
The Governor of Pennsylvania, aided by the Office of State Planning and Development and funded by two Federal agencies, has proposed a Rail Trust Fund of $12 to $13 billion for grants to all U.S. railroads for improvements in track, yards and other facilities over a six-year period. Like the Highway Trust Fund, users would pay the costs. Every railroad would collect and pay into the fund a 5% surcharge on freight revenues. These funds would pay off government-backed obligations financed over 30 years. Rehabilitation of road and track would require almost $7 billion; electrification, $3.2 billion; modernization and expansion of fixed facilities, $1.9 billion; modernization of yards, $900 million. Lower operating costs would result.

Prepared with Federal Financial assistance provided by the Department of Housing and Urban Affairs, Appalachian Regional Commission and Department of Commerce.

Shapp, MJ
Pennsylvania Department of Transportation 62 PP, Figs., Tabs., Phots.

PURCHASE FROM: Pennsylvania Department of Transportation Bureau of Planning Statistics, Harrisburg, Pennsylvania, 17120 Repr. PC

25 071966
HIGH SPEED GROUND TRANSPORTATION ACT OF 1965 AND THE RAILROAD TECHNOLOGY PROGRAM 1973
The report presents studies on rail technology, such as improved passenger and freight service, safety research, improved track, rail and vehicle dynamics. The study evaluates the Washington-New York Metroliner and the Boston-New York Turbotrain Demonstration including ridership and mileage. The report also presents research on advanced systems such as tracked levitated, magnetically levitated, and tracked air cushion vehicle systems along with supporting technology, such as propulsion, communications and control, guideways and tunneling.

Federal Railroad Administration, (FRA- ORD/D-74-54) Annual Rpt #7, 1973, 205 pp

ACKNOWLEDGMENT: FRA (PB-233064/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-233064/5, DOTL NTIS

25 072001
APPRAISAL OF INVESTMENTS IN LONG DISTANCE PASSENGER TRANSPORT OF GERMAN FEDERAL RAILWAY AND IN AIR TRANSPORT WITHIN THE FEDERAL REPUBLIC OF GERMANY UP TO 1980, BASED ON A COST-BENEFIT ANALYSIS [Die Beurteilung von Investitionen im Fernreiseverkehr der deutschen Bundesbhan und im Luftverkehr der Bundesrepublik Deutschland bis 1980 auf der Grundlage der Kosten-Nutzen-Analyse]
The study was designed to produce a decision making tool to help in the appropriate allocation of public funds to long distance passenger transport. The essential parts of the study were stock-taking, analysis, and forecast of supply and demand in rail-bound long distance travel and in domestic air travel within the Federal Republic of Germany. On this basis, possible development and extension alternatives were evaluated in terms of their costs and benefits. Taking the traffic flows resulting from the various levels of development as a point of departure the study in terms of a cost benefit comparison was restricted to the extreme situations: Situation 1: Maintaining the present development level of rail and air transport; Situation 2: Exclusive development of the Federal Railways' long distance network; Situations 3: Exclusive development of the regional air transport network; Situation 4: Simmutaneous development of both networks. These situations were combined in such a way as to form eight variants. Specific costs of transport, travel times, and effects on the environment as derived from the capital investments were assigned to each variant. Estimates of traffic volume and of journey length were used to calculate transport service and its cost for each variant. It became evident that by investing in rail transport considerable savings over the present situation could be achieved. Investments in air transport, on the other hand, will result in sizeable cost increases. [German]

This is a 2 volume set. Volume 1 includes a detailed abstract in English. Volume 2 includes the references and appendices.

Battelle Memorial Institute No. 40, 1970, 639 pp, 116 Tab., 137 Ref.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Battelle Memorial Institute Frankfurt, West Germany Repr. PC

25 072018
BRITISH RAILWAYS BOARD ANNUAL REPORT AND ACOUNTS 1973
British Rail made a profit, before interest payments, of 5.7 million pounds in 1973 despite a loss of 4.6 million by the Rail division. Besides the railways, the systems includes ships, hovercraft, harbors, hotels, and rail workshops, all of which showed profits. After payment of interest, however, there was a deficit of 51.6 million pounds. Passenger and freight rail business increased. Inflation and the energy shortage contributed to the problem of trying to revitalize the rail system. The problem is complex and there is no short term solution, especially in view of the overall economy at this time. Substantial investments must be made to produce a high-quality rail system.

British Railways Board July 1974

ACKNOWLEDGMENT: TSC
PURCHASE FROM: British Railways Board Melbury House, London NW1 6JW, England Repr. PC

25 072460
CAN THE RAILROADS MEET TODAY'S CHALLENGES?
Three areas are covered in this provocative appraisal of a troubled railroad industry: 1) A broad overview of the nation's commerce and the role of railroads; 2) Opportunities and pitfalls which could result from the energy/environmental crisis and 3) Where railroads fit in the agricultural scene.

Springrose, JV (Cargill) *Traffic World* Vol. 159 No. 5, 1974, pp 68-71

PURCHASE FROM: Traffic Service Corporation 815 Washington Building, Washington, D.C., 20005 Repr. PC

25 072463
MAKING UP THE COLLECTIVE MIND
The massive intrusion of modern technology into questions of sweeping public concern has tended to increase associated complexities beyond the capacities of individual decision makers. Technology has also tended to raise the ante while increasing the frequency of the gamble. Given the

complexity of today's social services, political problems and technical hardware, the young discipline of decision analysis has attained added significance. One of American's most critical experiences with piecemeal decision making has been in transportation policy. Chaotic results make it clear that a more orderly procedure for dealing with problems must fully account for potential consequences.

Tribus, M (Xerox Corporation) *IEEE Spectrum* Vol. 11 No. 10, Oct. 1974, pp 59-64, Figs., 7 Ref.

PURCHASE FROM: ESL Repr. PC, Microfilm

25 072466
SOME POLICY IMPLICATIONS OF NORTHEASTERN RAILROAD PROBLEMS
There is no single source of the Northeastern railroad problem; it is the result of a multiplicity of interrelated problems. Generally, the problems of that region are a reflection to an intensified degree of problems troubling all railroads. It is concluded that nothing short of fairly drastic reforms can restore Northeastern and some other railroads to financial health. Inevitably these measures will have adverse effects on shipper and carrier interests, resulting in political pressures. Legislative efforts to restore railroad viability will severely test the ability of the political process to subordinate individual interests to the greater public good. The prospects are not promising.

Harbeson, RW (Illinois University, Urbana) *Transportation Journal* Vol. 14 No. 1, Sept. 1974, pp 5-12, Refs.

PURCHASE FROM: American Society of Traffic and Transportation 547 West Jackson Boulevard, Chicago, Illinois, 60606 Repr. PC

25 072479
THE ROLE AND REGULATION OF RAIL TRANSPORT IN THE EUROPEAN ECONOMIC COMMUNITY (EEC)
As transport policy in Europe has, for the most part, been developed from a purely national point of view, the individual transport modes in European countries have, therefore, developed differently. Isolated transport industries grew up, which were themselves not coordinated and which could not even be considered as national systems. This fact is expressed in essentially sectoral national rail, road and inland-shipping policies. In the course of economic integration of national state, an extremely important aspect of transport policy is the linking of national transport systems so that international demand can be dealt with in the framework of a complete West European transport system.

St Seidenfus, H (Munster University, West Germany) *Transportation Planning and Technology* Vol. 2 No. 1, 1973, pp 55-62, 4 Tab.

PURCHASE FROM: ESL Repr. PC, Microfilm

25 072561
OPERATING SUBSIDIES FOR URBAN MASS TRANSPORTATION
The principal issue is not whether urban mass transportation operations should be subsidized, but where the source of the subsidy should be. The author concludes that regardless of the method chosen, the problems of managing an operating subsidy should not be a barrier to the implementation of such a policy. Such subsidies seem vital so long as meeting pollution standards and conserving energy are matters of national importance. If these problems are brought under control, operating subsidies over a longer period may be justified if they are applied in an attempt to reach national workable objectives for urban mass transportation.

Smerk, GM (Indiana University, Bloomington) *Traffic Quarterly* Vol. 28 No. 4, Oct. 1974, pp 603-618

PURCHASE FROM: Eno Foundation for Transportation, Incorporated P.O. Box 55, Saugatuck Station, Westport, Connecticut, 06880 Repr. PC

25 072578
TRANSPORTATION AND THE ENERGY CRISIS: A STATE VIEW
In developing the relationship between railroads and the states, the author observes that states need to build a knowledge of railroads because most of them have little understanding of railroad problems. The states need also to undertake rail planning and research as part of the overall planning process. Although the railroads, as private enterprise, occupy a different relationship to the transportation planning process than publicly owned systems such as highways and airports, the states are sincerely looking to railroads for cooperative planning in the creation of multimodal transportation systems for both goods and people that would be more efficient than what exists now.

Proceedings of the conference held at the University of Wisconsin, May 6-8, 1974, sponsored by the Federal Railroad Administration and the Wisconsin Department of Transportation & contained in "The Role of U.S. Railroads in Meeting the Nation's Energy Requirements."

Weber, WS (California State Transportation Board)
Wisconsin University, Madison Proc Paper Oct. 1974, pp 6-9

ACKNOWLEDGMENT: FRA
PURCHASE FROM: Wisconsin University, Madison Graduate School of Business, Madison, Wisconsin, Repr. PC

25 072720
TRANSIT OPERATING SUBSIDIES-1974
Public and political attitudes shifted in the wake of the energy crisis from a capital orientation to subsidies for meeting operating deficits. The author concludes that the end result will be adequate operating subsidies for most metropolitan areas. The net result of subsidy programs so far has been to hold the line on transit usage with the full benefit of fare stabilization yet to be realized. Transit, it was noted, may finally be ready to move to the next major problem of maximizing the usefulness of the services to the general public which, in the end, is providing the subsidy.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Gerlach, ER (URS/Madigan-Praeger, Incorporated)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 73-79, 1 Tab.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

25 072724
INSTITUTIONAL CONSTRAINTS ON COMPREHENSIVE TRANSPORTATION PLANNING AT THE FEDERAL LEVEL
From the earliest days the Federal government has played a significant role in the national transportation activities. What has evolved is a parochial view of transportation. The time is rapidly approaching, if it has not already arrived, concludes the author, when the nation can no longer afford the luxury of uncoordinated federal policies and programs in a sector so large and pervasive as transportation. The likely consequences of failing to prepare for a more austere future relate not only to the efficient use of resources, but also to their equitable distribution. With planning, needs can be broadened to include not only the institutions which provide transportation, but also the individuals who must be the ultimate concern.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Shuldiner, PW (Massachusetts University, Amherst)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 285-289, 2 Fig.

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

25 072732
TECHNICAL ANALYSIS AND POLITICAL ACTIONS
It has become unnecessary to guess about the prospects for private enterprise funds to support transit. It is uncertain for most cities to know how much and what kind of public funds are going to be available from federal sources. Transit planning has often shifted from a long-term approach to a much more short-range orientation. The author notes that increased transit funds will need to be an act of faith, or at least a feeling that the near total automobile reliance of the past needs to be changed. Transit professionals will need to work with citizen and political leaders, steering them toward acceptance of funding that can assure local mobility without overwhelming dependence on the automobile.

This paper is from Transportation in Focus, Proceedings of the Fifteenth Annual Meeting of the Transportation Research Forum, San Francisco, California, 10-12 October 1974.

Keith, RA (Voorhees (Alan M) and Associates, Incorporated)
Cross (Richard B) Company Proc Paper Vol. 15 No. 1, 1974, pp 80-86

ACKNOWLEDGMENT: Transportation Research Forum
PURCHASE FROM: Vietsch (Grant C) 181 East Lake Shore Drive, Chicago, Illinois, 60611 Repr. PC

25 072806
HIGH SPEED GROUND TRANSPORTATION ACT OF 1965
Coupled with the Northeast Corridor Transportation Project, the high speed program was sought to: determine transportation demand in a most heavily populated and industrialized intercity corridor region; analyze engineering systems alternatives for meeting that demand; demonstrate traveller response to selected transportation improvements; and undertake research and development in fields of entirely new systems as well as stimulating that in existing systems.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Department of Transportation #4, 1970, 159 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: NTIS Repr. PC

PB-196799, DOTL NTIS

25 080468
HIGH-SPEED TRAINS HIT A RED SIGNAL
Present plans now call for the Department of Transportation to halt all its work on a tracked air-cushion vehicle built by Grumman Corporation and spend only token amounts to continue work on magnetic levitation technology by Ford Motor Company and Rohr Industries, Inc. A similar disenchantment with high speed trains is beginning to show up overseas. France slowed its spending on 300 mph R & D to a trickle and Japan postponed for five years a decision on whether to attempt to develop 300 mph trains.

Business Week No. 2363, Jan. 1975, pp 88-89

PURCHASE FROM: McGraw-Hill, Incorporated 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

25 080767
CHICAGO ON THE MOVE IN SPITE OF ITSELF
In 1974 a Regional Transportation Authority was created in Chicago to coordinate the bus and railway commuter services in the Chicago area. A major route expansion for buses and railways is required and a strong Transportation Authority will be needed to ensure that the plans are carried out.

Modern Railroads Vol. 29 No. 10, Oct. 1974, pp 54-57

ACKNOWLEDGMENT: Canadian National Railways, Headquarters Library
PURCHASE FROM: Cahners Publishing Company, Incorporated 5 South Wabash Avenue, Chicago, Illinois, 60603 Repr. PC

25 080943
THE ROLES OF GOVERNMENT IN TRANSPORTATION PLANNING
Primary responsibility for transportation planning has moved from private industry to government. This shift has occurred as a result of growing awareness of the interdependence of transportation planning with all other aspects of the urban planning process. Decisions are no longer based solely on the economic advantage of the operator, but now are governed primarily by community-established acceptance criteria covering a wide range of social, economic, environmental and service impacts. The paper presents a discussion of governmental responsibility and strategy options, which may help to clarify some of the complex issues which face all levels of government as these new roles evolve.

Roennau, LV
Rand Corporation P-5079, Aug. 1973, 28 pp

ACKNOWLEDGMENT: NTIS (AD/A-002179/0SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

AD/A-002179/0SL, DOTL NTIS

25 081385
ECONOMIC THEORY OF REGULATORY CONSTRAINT
In this book the regulatory process is described by the imposition of quantifiable constraints that limit a firm's ability to maximize its objective function—usually taken to be profits. The book has little to say about the aims of regulation, the rationale for specific regulatory policies, or the problems of implementing and enforcing regulation. What is described in a formal and rigorous analysis showing the theoretical implications of alternative regulatory constraints.

Bailey, EE
Heath Lexington Books 1973, 200 pp

PURCHASE FROM: Heath Lexington Books Heath (DC) and Company, Lexington, Massachusetts, Orig. PC

25 081632
STATE RESPONSE TO RAILROAD ABANDONMENT
This paper examines the abandonment of railroad plant from the standpoint of state government. After discussing the problem as a matter of national and state concern, the paper suggests a role for the states in analyzing both major and minor abandonment proposals. Abandonment of rail lines is simply one aspect of broader rail and transport policy problems. The abandonment issue involves two different types and levels of concern, branch-line abandonment and major system reduction. Government response to branch-line abandonment has been scattered among various agencies; the rules of the regulatory game have been qualitative and judgemental. The wholesale relinquishment of trackage produces a different sort of public concern. Government response to threatened system abandonment, precipitated by the well-known problems resulting from the Penn Central merger, culminated with passage of the Regional Rail Reorganization Act of 1973. This paper attempts to apply benefit-cost analysis to branch-line abandonment. However, benefit-cost or other methods of analysis must be supplemented or superseded by social-cost considerations. Mediation and advance negotiation are reasonable means of approaching micro abandonments. But the emerging threat of system failure and loss requires additional response by the states. The final portion of this paper descripes Wisconsin's involvement in the resolution of rail abandonments.

This is one of four articles contained in the TRB publication "Intercity Freight Movement by Rail and Highway", RRIS #081631.

Fuller, JW (Wisconsin Department of Transportation) *Transportation Research Record* No. 511, 1974, pp 29-39, 41 Ref.

PURCHASE FROM: TRB Repr. PC

25 081636
SUMMARY DESCRIPTION 1995 TRANSPORTATION SYSTEM PLAN
The 1995 Transportation replaces the Regional Transportation Interim Plan and Program of 1971. The Chicago Area Transportation Study and Northwestern Indiana Regional Planning Commission, aided by the City of Chicago and Northeastern Illinois Planning Commission prepared this plan to provide a better transportation system for more than 3 million citizens of an eight-county area. The Plan is a corrdinated multimodal approach involving transit (composed of commuter railroads, rapid transit and bus), the highway system, airport system for commercial and general aviation, and the freight system involving rail, water, truck and energy corridors. The plan strives to meet 11 regional objectives which are listed.

This study has been funded in part by the Urban Mass Transportation Administration.

Chicago Area Transportation Study, Northwestern Indiana Regional Planning Commission Nov. 1974, 34 pp, 13 Fig., 4 Tab., Refs.

PURCHASE FROM: Chicago Area Transportation Study 300 West Adams Street, Chicago, Illinois, 60606 Repr. PC

25 081950
A STUDY OF REVENUE MECHANISMS FOR FINANCING URBAN MASS TRANSPORTATION
The report covers the analysis of two revenue mechanisms for financing urban mass transportation, a transit fuel tax and an additional gasoline tax imposed in urban areas. The report includes analysis of the magnitude of revenues that could be raised, tax rates required to raise these revenues, tax incidence, potential impact on transit usage, and mechanisms for tax collection.

Department of Transportation Final Rpt. Feb. 1974, 100 pp

ACKNOWLEDGMENT: NTIS (PB-236005/5SL)
PURCHASE FROM: NTIS Repr. PC, Microfiche

PB-236005/5SL, DOTL NTIS

26 052589
INTERNATIONAL RAILWAY STATISTICS—STATISTICS OF INDIVIDUAL RAILWAYS—YEAR 1972
These statistics are divided into four main groupings: 1) Composition and means of the systems; 2) Operating results, 3) Financial results; and 4) Miscellaneous. All measurements of weight and length shown in these tables are expressed in the decimal metric system.

International Union of Railways, BD 1972, 193 pp, Tabs., Apps.

ACKNOWLEDGMENT: UIC
PURCHASE FROM: UIC Repr. PC

26 057353
URBAN TRANSPORTATION POLICY: AN ANNOTATED BIBLIOGRAPHY
The purpose of the bibliography is to provide a collection of material dealing exclusively with urban transportation policy. It is designed to enable policy analysts, planners and government officials to understand how urban transportation policy is formed and how current arrangements may be altered to influence future outcomes. The bibliography is organized to emphasize the demands that shape policy, the institutional framework that constrains policy alternatives and how these factors shape supply strategies. Sections present overviews of urban transportation problems and prospects, literature on the demand or input side of transportation, transportation decision-making and management, policy-making arrangements in the U.S., transportation facilities and foreign transportation policies.

Stroh, PAL
Michigan University, Ann Arbor, (UMTA-MI-11-0001) Nov. 1973, 120 pp

ACKNOWLEDGMENT: NTIS (PB-232264/2)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-232264/2, DOTL NTIS

26 057887
HIGH SPEED GROUND TRANSPORTATION ACT OF 1965 AND THE RAILROAD TECHNOLOGY PROGRAM 1973
The report presents studies on rail technology, such as improved passenger and freight service, safety research, improved track, rail and vehicle dynamics. The study evaluates the Washington-New York Metroliner and the Boston-New York Turbotrain Demonstration including ridership and mileage. The report also presents research on advanced systems such as tracked levitated, magnetically levitated, and tracked air cushion vehicle systems along with supporting technology, such as propulsion, communications and control, guideways and tunneling.
See also report dated Sep 72, PB-222 261.

Federal Railroad Administration, (FRA-ORD/D-74/54) Annual Rpt No. 7, 1973, 205p

ACKNOWLEDGMENT: NTIS (PB-233064/5)
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-233064/5, DOTL NTIS

26 071615
TRAMWAYS OF WESTERN GERMANY
The second edition of this pocket-size handbook of basic information on tramway systems in West Germany brings the account up to date with notes on Stadtbhan and semi-metro plans and progress. The book is useful also as a survey of fare collection systems and rolling stock builders.

Taplin, MR
Light Railway Transport League Book

ACKNOWLEDGMENT: Railway Gazette International
PURCHASE FROM: Light Railway Transport League 64 Grove Avenue, Hanwell, London W7 3ES, England Repr. PC

26 071627
TRANSPORTATION RESEARCH INFORMATION SERVICES
During the past ten years the Transportation Research Board has been increasingly active in the development of computer-based information services. At present these services include the Highway Research Information Service (HRIS), the Maritime Research Information Service (MRIS), and the Railroad Research Information Service (RRIS). The Board has also assisted in the development of special services for transportation research in progress, highway safety, and transportation noise. In all these services the general objective is to provide the research community with improved access to information about ongoing and completed research activities in the transportation field. The papers and discussions relate to two recent developments that concern all of the modal information services: on-line retrieval access to centrally stored information and network access to information that is stored by any service in the network. The Board has experimented with on-line access since 1969, but not until 1973 was a demonstration project implemented on a national scale to study the effectiveness of on-line retrieval of transportation research information.

Transportation Research Record No. 493, 1974, 38 pp, 7 Fig., 6 Ref.

PURCHASE FROM: TRB Repr. PC

26 072042
WORLD TRANSPORT DATA
Statistics are given for transport in 137 countries. The types of data given vary, depending on availability for each country. Categories include transport networks, railway rolling stock and traffic, road networks and vehicles, numbers of buses and coaches in public transport, transport vehicles by loading capacity, number of transport enterprises and employment, professional road transport enterprises by number of vehicles, rail passenger traffic, total goods traffic, rail goods traffic by commodity groups, coastal and inland waterway traffic, road goods traffic by commodity groups, international goods traffic, and sea traffic.

International Road Transport Union 1973, 259 pp, Tabs., Refs.

ACKNOWLEDGMENT: TSC
PURCHASE FROM: International Road Transport Union Department of Research and Transport Economics, Geneva, Switzerland Repr. PC

26 072043
TRANSDOC VOLUME 1 AND 2
TRANSDOC is a bibliographic bulletin of documentation in transport economics and policy. The documents are mainly European, and include mongraphs, articles, and extracts. For each document, the following information is given, as applicable and available: Issuing country, issuing center, form, language, author, title, publisher, date of publication, number of graphs, photos, etc., location of original used for TRANSDOC, abstract and subject fields. Also included is a list of centers contributing to the compilation. Author, title and subject indexes are included.

European Conference of Ministers of Transport Mar. 1974

ACKNOWLEDGMENT: TSC
PURCHASE FROM: Organization for Economic Cooperation and Devel Suite 1207, 1750 Pennsylvania Avenue, NW, Washington, D.C., 20006 Repr. PC

26 072557
FUNDAMENTALS OF TRANSPORTATION ENGINEERING
The wealth of design and operation information provided in this text will enable the student and practicing engineer to evaluate existing components of a transportation system, and to design and construct new or improved means for moving people and goods more efficiently in any given environment. All facets of transportation engineering are discussed: roads and pavements, airports, railroads, rivers and harbors, pipelines, beltlines, and undersea. Emphasis throughout is on real-world problems and their realistic solutions.

Hennes, RG Ekse, M (Washington University, Seattle)
McGraw-Hill Book Company 624 pp

ACKNOWLEDGMENT: McGraw-Hill Book Company
PURCHASE FROM: McGraw-Hill Book Company 1221 Avenue of the Americas, New York, New York, 10020 Repr. PC

26 072794
A BIBLIOGRAPHY ON THE DESIGN AND PERFORMANCE OF RAIL TRACK STRUCTURES
This bibliography was prepared as part of the Rail Supporting Technology Program being sponsored by the Rail Programs Branch of the Urban Mass Transportation Administration. It is based on the reference material that was used to evaluate the technical factors which govern the design and performance of at-grade track structures for urban rail systems. While

most of the reference material that has been included is directly related to track used for railroad, rail rapid transit and light rail transportation, there are some additional references on related topics such as rail vehicle dynamics, soil mechanics, stress analysis, etc. However, this bibliography does not include a comprehensive review of these related topics. This survey includes much of the published literature on track design, track loading, ballast, wood and concrete cross ties, rail and rail fasteners. It also includes considerable material on track problems such as rail wear corrugation, rail defects, rail joints and track degradation. The formal literature search for this bibliography covered the time period from about 1963 to 1973. The principal sources were the National Technical Information Service (NTIS) file of government reports, Engineering Index, and the Applied Science and Technology Index. Earlier references were identified from the Railroad Research Information Service (RRIS) computerized data base and bibliographies prepared by the RRIS and the Association of American Railroads.

Individual abstracts from this bibliography have been selected under RRIS numbers 072794-072851.

Prause, RH Pestel, HC Melvin, RH
Battelle Columbus Laboratories, (DOT-TSC-UMTA-74-11) Final Rpt. UMTA-MA-06-0025-74-7, Sept. 1974, 142 pp

DOT-TSC-563

ACKNOWLEDGMENT: UMTA
PURCHASE FROM: NTIS Repr. PC

26 072827
URBAN MASS TRANSPORTATION ABSTRACTS
The volume contains 466 abstracts of reports in the field of urban mass transportation which are available from the National Technical Information Service. The reports were generated by research, development, and demonstration; technical studies, and university research and training projects sponsored by the Urban Mass Transportation Administration under the Urban Mass Transportation Act of 1964 (amended). Each abstract contains complete bibliographic data, from two to twelve keyword identifiers, up to 400 words of text capsulizing major topics covered in the report, and the NTIS accession number and prices.

This abstract is also contained in "A Bibliography on the Design and Performance of Rail Track Structures", September 1974, RRIS #072794, which was prepared for the Urban Mass Transportation Administration.

Urban Mass Transportation Administration, (UMTA-TRIC-1-72) Oct. 1972, 540 pp

ACKNOWLEDGMENT: Battelle Columbus Laboratories
PURCHASE FROM: NTIS Repr. PC
PB-213212/4, DOTL NTIS

26 072940
A BIBLIOGRAPHY OF ARTICLES RELATED TO TRANSPORTATION IN MAJOR ECONOMIC JOURNALS. 1960-1971
This bibliography includes selections from 32 economics journals, virtually all of which do not devote themselves primarily to transportation. A few journals are included which are not primarily economic in orientation, but have published articles germane to the economics of transportation. Citations involving urban transportation are very selective and there is nothing on public utility economics. Articles are listed by journal in chronological order. There is no classification nor annotation. An author index is included.

Waters, WG, II
British Columbia University, Canada Dec. 1972, 31 pp, Refs.

ACKNOWLEDGMENT: British Columbia Universities, Canada
PURCHASE FROM: British Columbia University, Canada Centre for Transportation Studies, Vancouver V6T 1W5, British Columbia, Canada Repr. PC

26 080109
SCIENTIFIC, TECHNICAL, AND ENGINEERING SOCIETIES PUBLICATIONS IN PRINT 1974-1975
This work helps to fill a long-felt need for bibliographic information pertaining to the publications of some 150 scientific and engineering societies. It also includes non-print material. Price information is given. Author and key-work subject indexes are included. For those who are involved in identifying and obtaining conference proceedings this is especially useful.

Kyed, JM Matarazzo, JM
Bowker (RR) 1974, 233 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Bowker (RR) 1180 Avenue of the Americas, New York, New York, 10036 Orig. PC

26 080112
RAILROAD RESEARCH BULLETIN VOLUME 1, NUMBER 1, SPRING 1974
Th publication contains 1,841 abstracts of journal articles and research reports selected by Railroad Research Information Service (RRIS) from current railroad literature and 160 summaries of ongoing research activities in the railroad field. The material covers the entire range of railroading from technology to management, economics, government regulation, and operations. The material is arranged according to the RRIS classification scheme in two separate sections, one for the abstracts and one for the summaries. The publication also contains subject term, author, and source indexes.

Transportation Research Board, (RRIS-7401) FRA/D-74-34, Apr. 1974, 470 pp

Contract DOT-OS-00035

ACKNOWLEDGMENT: FRA
PURCHASE FROM: NTIS Repr. PC, Microfiche
PB-233880/4GA, DOTL NTIS

26 080113
RAILROAD RESEARCH BULLETIN, VOLUME 1, NUMBER 2, AUTUMN 1974
This publication contains 1,647 abstracts of journal aritticles and research reports selected by RRIS from current railroad literature and 160 summaries of ongoing research activities in the railroad field. The material covers the entire range of railroading from technology to operations, management, economics and government involvement. Literature sources are worldwide. The material is arranged according to the RRIS classification scheme in two separate sections, one for abstracts and one for summaries. The book also contains subject term, author and source indexes.

Outside the United States add 10% to the cost of the publication. Previous editions have the following NTIS accession numbers: PB-220220, PB-226484, PB-233880.

Transportation Research Board, (RRIS-7402) FRA-ORD&D-75-13, Sept. 1974, 448 pp

Contract DOT-OS-40022

ACKNOWLEDGMENT: FRA
PURCHASE FROM: TRB Repr. PC

26 080294
REPORT ON LITERATURE AND RELATED EXPERIENCE. PHASE 04 REPORT
Knowledge of the work done by others in technical areas related to the RPI-AAR Cooperative Research Program was largely unknown to project personnel. A review of the technical work already done was necessary to optimize project planning and avoid duplication of work while fulfilling project objectives. It was decided that the review would be most effectively accomplished by: 1. Engaging a research organization to review the literature pertaining to non-tank car pressure vessel destructive testing; puncture resistance; size and grouping vs. hazard; and material testing and selection. 2. Conducting a seminar attended by experts from industry, technical associations, consultants, research organizations and government. 3. Reviewing the files of trade associations. 4. Reviewing literature in areas of tank car accidents, properties of pressure vessel materials (including tank cars), safety valve technology, model theory, pressure vessel stress analysis, safety relief valve sizing, LPG and NH3 behavior under fire conditions, and intumescent, ablative and insulative coatings. 5. Collecting and assembling all pertinent literature in a library and cataloguing each article for ready reference.

An RPI-AAR Cooperative Project.

Skogsberg, AM
Association of American Railroads Research Center, (RA-04-1-8) R-131, July 1971, 51 pp, 326 Ref.

ACKNOWLEDGMENT: AAR
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Rerp. PC

26 080340
REPORT ON ACCIDENT REVIEW. PHASE 01 REPORT
This report summarizes the activities under Phase 01 of the RPI-AAR Railroad Tank Car Safety Research and Test Project. Phase 01 was concerned with the collection and cataloging of tank cars in an accident environment. This report summarizes the procedures used to gather and catalogue the data, the sources from which data was collected, and the organization of the data in the Project files. Much of the data was coded and transferred to a magnetic tape for computer retrieval. The data codes, format of the data tape, copies of the computer programs used to maintain the tape and retrieve information, and examples of the summary information obtained from computer analysis of the data are also included in this report.
An RPI-AAR cooperative program.

Weston, RA
Association of American Railroads Research Center, (T-5-1) Final Rpt. RA-01-4-16 (R-139), June 1972, 75 pp

ACKNOWLEDGMENT: Association of American Railroads Research Center
PURCHASE FROM: Association of American Railroads Research Center 3140 South Federal Street, Chicago, Illinois, 60616 Repr. PC

26 080466
POWER AND TRANSPORT
The petroleum crisis, which came about so very suddenly in October 1973, but which was bound to happen sooner or later, has compromised a situation of economic stability where low prices and the glut of liquid energy played a determinant role. In the transport sector more particularly, there is not so much a reversal of trends as a technico-economic reappraisal of the position and policies that the various transport modes expect to defend over the next ten years. The appended bibliographical selection is precisely designed to indicate the more important documents dealing with the various aspects of this problem of energy linked to transport. Attention is drawn to the very selective character of this bibliography (164 references), in which numerous articles recently published in the popular press have been deliberately excluded.

International Union of Railways Biblio. May 1974, 53 pp

ACKNOWLEDGMENT: UIC
PURCHASE FROM: International Union of Railways, BD 14 rue Jean Rey, 75015 Paris, France Repr. PC

26 081627
CRITICAL SURVEYS OF DATA SOURCES: MECHANICAL PROPERTIES OF METALS
This study was undertaken with the objective of providing a detailed critical survey of the existent sources of mechanical property data for commercially available metals and alloys. The survey assesses the scope, assets, and deficiencies of about 40 of the most prominent sources of such information. Included are: handbooks and technical compilations, information centers, foreign information sources, technical societies, and trade associations. Since the aim in making this survey was to restrict it to sources that actually had compilations of mechanical property data in some form, sources offering only generalized guides to the literature, monographs, textbooks, or periodicals publishing original research or engineering articles were not included. Such generalized guides, however, are treated in a separate appendix.

NBS Special Publication #396-1, 1974, 81 pp

ACKNOWLEDGMENT: ASME Journal of Mechanical Engineering
PURCHASE FROM: Government Printing Office Superintendent of Documents, Washington, D.C., 20402 Orig. PC

Ongoing Research Summaries

00 036999
PRESERVATION, IMPROVEMENT AND REPLACEMENT OF ELEVATED TRANSPORTATION STRUCTURE BY ENGINEERING-PLANNING
The contractor shall carry out initial studies to determine the behavior of elevated structures from two standpoints: Existing structures, which do not possess acceptable dynamic characteristics based on present day criteria, and new structures, which can be designed to ensure that the required dynamic characteristics are within acceptable limits. This research program shall analytically model structural systems consisting of the elevated structure itself, the foundation, and the surrounding soil. The analysis shall be sufficiently general so that the behavior of a wide variety of structural systems can be investigated. As an analytic program requires field measurements to ensure that the numerical results truly represent field conditions, a small field measurement program shall be included in this research program.

PERFORMING AGENCY: Illinois University, Chicago
INVESTIGATOR: Silver, ML
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: McFarland, RK (Tel. 202-4269639)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973
COMPLETION DATE: Aug. 1974 TOTAL FUNDS: $ 98920 Contract DOT-OS-30092

ACKNOWLEDGMENT: Office of Systems Development and Technology

00 038648
DEVELOPMENT AND TESTING OF NEW TUNNEL SUPPORTS
The University will investigate and test new concepts in rational tunnel design, new materials and techniques for shotcrete support of tunnels and new materials and improved structural design for segmented tunnel linings.

PERFORMING AGENCY: Illinois University, Urbana
INVESTIGATOR: Peck, RB
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Lucke, WN (Tel. 202-4260808)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 499950 Contract DOT-FR-30022

ACKNOWLEDGMENT: FRA

00 045081
CASE HISTORIES OF URBAN RAPID TRANSIT TUNNEL AND STATION SYSTEMS IMPLEMENTATION
Objectives are to structure the processes within a modeling framework, to collect and analyze cost data within this framework, to identify and quantify safety and environmental considerations and constraints within the framework, to analyze contractual arrangements used in urban tunneling, to identify and describe the technologies and tools employed, and to formulate an analysis for determination of system sensitivities and optimization of the Rapid Transit tunneling process.

PERFORMING AGENCY: Bechtel Corporation
INVESTIGATOR: Kovatch, G
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kovatch, G (Tel. 617-4942756)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973
TOTAL FUNDS: $ 229330 Contract DOT-TSC-601

ACKNOWLEDGMENT: TSC

00 045960
TUNNEL LINING
The contractor shall perform and report on the following: Task 1. The prior work of the Principal Investigator shall be specialized for the specific case of the tunnel lining of circular cross-section. Task 2. The prior work of the Principal Investigator shall be extended to include the case of the tunnel lining of horseshoe shaped cross section. Task 3. The system of a linkage of prefabricated structural elements forming a tunnel lining shall be studied. Task 4. An in-situ test of a tunnel structure under construction shall be conducted.

PERFORMING AGENCY: California State University
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: McFarland, RK (Tel. 202-426-9638)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 26727 Contract DOT-OS-40016

ACKNOWLEDGMENT: Office of Systems Development and Technology

00 045970
PNEUMATIC-HYDRAULIC MATERIAL TRANSPORT SYSTEM
The objective of this study is to advance the technology of tunnel excavation by increasing the rate of muck removal from the tunnel face.

PERFORMING AGENCY: Colorado School of Mines
SPONSORING AGENCY: Office of the Secretary of Transportation, Department of Transportation
RESPONSIBLE INDIVIDUAL: Pitts, HB (Tel. 202-426-4311)

STATUS: Active NOTICE DATE: Feb. 1975 COMPLETION DATE: July 1974
TOTAL FUNDS: $ 43133 Contract DOT-OS-30123

ACKNOWLEDGMENT: Office of the Secretary

00 046488
NATIONAL INFORMATION SERVICE FOR EARTHQUAKE ENGINEERING
This grant is the third year support for GI-28098X. It is a companion to Grant GK-28349X to University of California at Berkeley.

PERFORMING AGENCY: California Institute of Technology, Division of Engineering and Applied Science/
INVESTIGATOR: Hudson, DE
SPONSORING AGENCY: National Science Foundation Division of Advanced Technological Applications/ GI-28098X3,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1973
COMPLETION DATE: Mar. 1974 Grant GI-28098X

ACKNOWLEDGMENT: Science Information Exchange (GSE 3202 2)

00 047346
A MODEL FOR SYSTEMS ANALYSIS OF TUNNELING AND EXCAVATION
The purpose of this research is to develop a computer model of the tunneling-excavation process, using techniques of systems analysis. The model is intended to be as comprehensive and as realistic as is possible; toward this end, close liaison will be maintained with appropriate contractors, government agencies, equipment manufacturers and engineering organizations. The model will be used for the following purposes: 1) To conduct sensitivity analyses to identify needed improvements in the current state of the art and to assess the impact of such improvements, if they could be realized by research and development investment; 2) to evaluate specific current or proposed innovations in tunneling technology on a cost-benefit basis; 3) to provide a means for rational cost estimation of tunnel construction, including the use of probabilistic methods when advisable because of geologic, hydrologic, and other uncertain factors; and 5) to permit optimization of the total tunneling system according to selected criteria such as construction time, construction cost, total cost including the service provided by the facility, safety, minimum disruption of contiguous activities, etc. A comprehensive analysis considering social as well as technical and economic factors is sought.

PERFORMING AGENCY: Massachusetts Institute of Technology, Department of Civil Engineering
INVESTIGATOR: Mcgarry, FJ Moavenzadeh, F
SPONSORING AGENCY: National Science Foundation Division of Advanced Technological Applications GI-34029A1,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 137500

ACKNOWLEDGMENT: Science Information Exchange (GSQ 219 2)

00 048773
SEGMENTED CONCRETE LINER STUDY
The U.S. Department of Transportation is interested in conducting a systems study of prefabricated, portland cement concrete, tunnel liners for use as both primary and secondary tunnel support on a wide range of ground conditions. The study is intended to establish the preliminary work required to develop standard concrete liner segments, incorporating the innovations necessary to provide efficient liners applicable primarily for excavation with tunneling machines. A system of liners will be developed for both single and double track transit tunnels.

PERFORMING AGENCY: Bechtel Corporation
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel. 617-494-2144)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1974 COMPLETION DATE: Nov. 1974 TOTAL FUNDS: $ 140265 Contract DOT-TSC-772 (CPFF)

ACKNOWLEDGMENT: TSC

00 048898
MUCK UTILIZATION IN THE URBAN RAPID TRANSIT TUNNELING PROCESS
The objective of this contract is to assess the problem of muck handling in the urban transit tunneling process and the potential for alternative means of utilization of muck as it emanates from rapid transit tunneling projects. The assessment will be based on case histories of materials handling and muck utilization, possible uses of muck, interactions with site surveys of subsurface geologies, and potential for contingency planning in waste material handling and utilization.

PERFORMING AGENCY: Haley & Aldrich, Incorporated
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 90224 Contract DOT-TSC-836 (CPFF)

ACKNOWLEDGMENT: TSC

00 048930
STUDY OF FEASIBILITY OF LOCATING UTILITIES IN TRANSPORTATION TUNNELS
The contractor shall supply the personnel, facilities, and materials necessary to accomplish the following items of work: Investigate the various types of utility lines, such as main trunk, feeder, and branch lines present in urban utility networks, and define the most probable sets that would be applicable for inclusion with a cut-and-cover transportation tunnel. Assess the relative technical and economic feasibility of the designs developed in Item 1. The institutional factors involved in determining the acceptance or rejection of the concept of providing for utilities in cut-and-cover transportation tunnels will be examined. A detailed analysis shall be made of the economic, technical and institutional factors involved with integrating utilities with a specific cut-and-cover tunnel.

PERFORMING AGENCY: IIT Research Institute
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel. 617-494-2144)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: July 1975 TOTAL FUNDS: $ 113996 Contract DOT-TSC-794 (CPFF)

ACKNOWLEDGMENT: TSC

00 048976
TUNNELING CONTRACTING PRACTICES STUDY
It is proposed that a study be made, and a workshop of experts be convened, to develop better methods to recommend contracting for underground construction. The goal is to develop and recommend to both private organizations and public works agencies, in some detail, improved contracting methods from which the owner receives the completed construction at lower cost and the contractor receives a just profit.

PERFORMING AGENCY: National Science Foundation
INVESTIGATOR: Israelsen, A
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Valente, RE (Tel. 617-494-2146)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Aug. 1974 TOTAL FUNDS: $ 25000 IA DOT-RA-74-39

ACKNOWLEDGMENT: TSC

00 058302
IMPROVEMENT OF PROBLEM TRACK SUBSOIL BY THE LIME SLURRY PRESSURE INJECTION METHOD
The ability of the Lime Slurry Pressure Injection (LSPI) stabilization technique to improve in-place railroad subgrades shall be examined. This study shall be directed toward developing the information requisite for field utilization of the promising LSPI stabilization technique. Emphasis shall be placed on verifying the concepts and premises on which the technique has been founded including delineation of those track and soil conditions under which LSPI is most effective. The study shall incorporate an evaluation of the present and past field performance of this track design criteria. Concurrent studies with regard to economic effectiveness and environmental impact shall be conducted to help provide a better guideline for future utilization.

PERFORMING AGENCY: Arkansas University, Graduate Institute of Technology
INVESTIGATOR: Blacklock, JR (Tel. 501-375-7247)
SPONSORING AGENCY: Department of Transportation
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

ACKNOWLEDGMENT: FRA

00 109559
ANALYSIS OF DEEP PILE FOUNDATIONS
The purpose of this project is to develop analytical (numerical) methods for determining stresses, deformations, and ultimate load-carrying capacities of axially loaded piles. No conventional methods are available that can handle the complexities encountered in the field. A finite element

formulation and a computer program will be prepared. The numerical results will be compared with data from several field pile load tests. A finite element procedure incorporating an isoparametric element and non-linear behavior for soil and interfaces has been developed. A computer program based on the procedure has been prepared, and a number of test results for piles and different soils have been considered for comparisons. The first example considered was a pile load test at the site of Jonesville lock in Louisiana. Consolidated drained triaxial tests at various densities and confining pressures have been preformed on the sand (from the site) to determine its stress-strain characteristics. Direct shear tests at various normal loads and densities have been performed to determine the stress-displacement laws for interfaces. The preliminary analysis showed good correlation between the numerical solutions and the field data for the load- displacement curves. Investigations are in progress. An interim report is being prepared to describe the work accomplished. /SIE/

PERFORMING AGENCY: Waterways Experiment Station, Soil and Rock Mechanics Branch
INVESTIGATOR: Desai, CS
SPONSORING AGENCY: Department of Defense Army Corps of Engineers /Department of the Army

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973 COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (ZTK 138 1)

00 115950
A COMPREHENSIVE PROGRAM ON ROCK PROPERTIES, TUNNELING AND EXCAVATION TECHNOLOGY AND NUCLEAR BLAST EFFECTS ON EARTH MEDIA

Third-year funding of continuation grant GI-34608x1 The goal is to establish a data center on properties of geological substances of interest to the geosciences in a manner useful for applications and research concerned with the use of underground space. The data center will be within the Thermophysical Properties Research Center. Data tables will be compiled, using published literature and reports, on thermal, mechanical, magnetic and electrical properties of geologic materials. Periodic data tables will also be produced on unconventional methods of tunneling and underground excavation technology as well as complete information on the methods, equipment, rates and costs for excavation of tunnels and underground openings. A minimal effort will be maintained in collecting data on blast effects on soils and rocks.

PERFORMING AGENCY: Purdue University, School of Civil Engineering
INVESTIGATOR: Judd, WR Touloukian, YS
SPONSORING AGENCY: National Science Foundation Division of Advanced Technological Applications GI-34608X2,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: May 1975 TOTAL FUNDS: $ 89000

ACKNOWLEDGMENT: Science Information Exchange (GSQ 213 2)

01 013867
CONSTRUCT TEST TRACK
Basic Agreement for design, construction, instrumentation, data collection & analysis, and maintenance of a test track. The purpose of the test track is to investigate methods of providing more stable railroad track for the higher train speeds and heavier car loadings.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1969 COMPLETION DATE: Sept. 1975 TOTAL FUNDS: $ 847200 Contract DOT-FR-90043 (BOA)

ACKNOWLEDGMENT: FRA

01 019580
FIELD STUDIES OF TRACK SUPPORTED ON PRESTRESSED CONCRETE TIES: TESTS TO EVALUATE STRUCTURAL CAPACITY OF SLAB AND BEAM RAIL SUPPORT STRUCTURES [PPS#4.C.2..2.]
No Abstract.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 COMPLETION DATE: Dec. 1978 TOTAL FUNDS: $ 199900 Contract DOT-FR-9-0043 (BOA)

ACKNOWLEDGMENT: FRA

01 036737
TRACK COMPONENT AND TRACK RESPONSE INVESTIGATIONS
C&O Railway Company and the B&O Railroad Company will conduct a series of track component and track response investigations.

PERFORMING AGENCY: Chessie System
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Aug. 1971 COMPLETION DATE: May 1976 TOTAL FUNDS: $ 89000 Contract DOT-FR-20015 (CS)

ACKNOWLEDGMENT: FRA

01 038054
ANALYZE DATA FOR SOIL PRESSURE CELLS
The contractor shall, through a contract with the Portland Cement Association, procure, install, monitor, and analyze data from Soil Pressure Cells in the cross tie portions of the Kansas Test Track on the Santa Fe Main Line. These additional cells will supplement and add to already existing load cells and measuring devices provided under the Basic Task Order No. 7. This supplemental program will yield additional data concerning the track characteristics and will reduce future overall monitoring costs for the Government by reducing the amount of labor involved in moving the lesser number sensors to new station locations and will allow more data to be collected over a greater distance of the test section without moving instrumentation devices.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: McCafferty, M (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1972 TOTAL FUNDS: $ 362886 Contract DOT-FR-90043/7 (CPFF)

ACKNOWLEDGMENT: FRA

01 038973
RAILROAD TRACK STRUCTURES RESEARCH
The Federal Railroad Administration (FRA) and the Association of American Railroads (AAR), the contractor, enter into a program to perform Railroad Track Structures Research. The program is expected to encompass a number of Tasks for research into a variety of technical factors affecting railroad track and related systems and subsystems. The initial portion of the Railroad Track Structures Research program shall consist of the four Tasks: Mathematical Modelling, Ballast and Subgrade Material Performance Tests, testing Phase, and Track Research Laboratory Facility. Other Tasks may be added from time to time depending upon availability of funds and contractual authorization.

PERFORMING AGENCY: Association of American Railroads
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1973 COMPLETION DATE: May 1975 TOTAL FUNDS: $ 447218 Contract DOT-FR-30038

ACKNOWLEDGMENT: FRA

01 038974
CONTINUOUS MEASUREMENT OF DYNAMIC COMPLIANCE CHARACTERISTICS OF RAILROAD TRACK
The contract is for the design, fabrication, demonstration and furnishing of equipment for the continuous measurement of dynamic compliance characteristics of railroad track.

PERFORMING AGENCY: Battelle Columbus Laboratories
INVESTIGATOR: Prause, RH (Tel. 614-2993151)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Woll, TP (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1973 COMPLETION DATE: Jan. 1977 TOTAL FUNDS: $ 299920 Contract DOT-FR-30051 (CPFF)

ACKNOWLEDGMENT: FRA

01 045168
DEVELOP AND JUSTIFY METHODOLGIES AND PROCEDURES FOR ANALYZING THE ECONOMIC COST OF RAILROAD ROADWAY
To develop and justify a set of methodologies and procedures for analyzing the economic costs of providing, maintaining and operating the railroad roadway and attendant structures under various geographic, physical, climatic, operating and traffic conditions for the purpose of developing a portion of the relevant economic costs for pricing purposes.

PERFORMING AGENCY: Tops On-Line Services Incorporated
INVESTIGATOR: Williams, JH (Tel. 415-9892670)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Pompomio, J (Tel. 202-426-0771)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973 COMPLETION DATE: June 1975 TOTAL FUNDS: $ 370000 Contract DOT-FR-30028 (CPFF)

ACKNOWLEDGMENT: FRA

01 047342
EVALUATION OF THE TECHNOLOGICAL & ECONOMIC EFFECTS OF VARIOUS CONTINUOUS WELDED RAIL SECTIONS & OF SPECIAL METALLURGY RAIL
An analysis of comparative life and economics of various rail sections for continuous welded rail under modern traffic loadings is in process. The study has been expanded to include jointed rails of special metallurgies such as heat treated, flame hardened, and hi-silicon. Wear patterns from field test locations are taken, analyzed, and equivalent cost conditions determined.

PERFORMING AGENCY: Illinois University, Urbana Department of Civil Engineering
INVESTIGATOR: Hay, WW Butler, AB Martin, GC Franke, MW Schuch, PM Reinschmidt, AJ Mikkelson, MJ Lawrence, FV
SPONSORING AGENCY: Burlington Northern

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Nov. 1973 COMPLETION DATE: Oct. 1974

ACKNOWLEDGMENT: Science Information Exchange (AI 733 2)

01 048783
RESPONSE OF THE RAILROAD TRACK WHEN SUBJECTED TO STATIC AND DYNAMIC LOADS
The contractor shall furnish the necessary facilities, materials, and such other services as may be required, and in consultation with the Government to complete performance of research study entitled Response of the Railroad Track When Subjected to Static and Dynamic Loads.

PERFORMING AGENCY: Princeton University
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1974
COMPLETION DATE: Aug. 1974 TOTAL FUNDS: $ 34219 Contract DOT-FR-40017

ACKNOWLEDGMENT: FRA

01 048894
KANSAS TEST TRACK
The Kansas Test Track constructed parallel to the Atchison, Topeka and Santa Fe Railway Company's main line between Aikman and Chelsea, Kansas, is a unique, eight-thousand foot long track structure test facility. When placed in full service, the track will become an integral part of the Santa Fe's main track and will be subjected to approximately 40 million gross tons of traffic per year.

PERFORMING AGENCY: Atchison, Topeka and Santa Fe Railway
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kestenbaum, MI (Tel. 202-426-9644)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974
COMPLETION DATE: Dec. 1974 TOTAL FUNDS: $ 68831 Contract DOT-FR-90043/13

ACKNOWLEDGMENT: FRA

01 058276
RAILROAD DEFERRED PLANT MAINTENANCE
A computer program was prepared to determine the deferred maintenance in track material replacement for twenty-five (25) Class I railroads, totaling 236,000 miles of track, to measure the railroad industry's condition with respect to track material replacement. The estimate of "deferred maintenance" was made by costing in 1974 dollars the installation of new track materials necessary to achieve a "normalized condition." "Normalized condition" was defined as the condition in which fifty percent (50%) of the usable life of track materials is remaining. The Railroad Annual Report Form A data used in the computer program was for the forty-year period from 1933 to 1972 inclusive.

PERFORMING AGENCY: Dyer (Thomas K), Incorporated
INVESTIGATOR: Dyer, TK (Tel. 617-862-2075)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Edson, WD (Tel. 202-426-0771)

STATUS: Complete NOTICE DATE: Feb. 1975 START DATE: Dec. 1973
COMPLETION DATE: May 1974 Contract DOT-FR-4-5005

ACKNOWLEDGMENT: FRA

01 058304
ANALYSIS OF THE STABILITY OF RAILROAD TRACK SUBJECTED TO STATIC AND DYNAMIC LOADS
The objective of this contract is to obtain information which will provide a rational basis for the design, construction and maintenance of railroad track of improved safety and economic efficiency by reducing the probability of catastrophic buckling. The activities of this contract will assist in determining the largest admissible geometric imperfections to prevent buckling of the track in the vertical plane and will initiate the analysis of horizontal buckling. A critical review of track stress analyses and field tests on track will provide a methodology for determining the characteristics of track performance under static and dynamic loads. In addition, a continuing review of foreign technical literature will provide for the incorporation of previous European and Soviet experience into ongoing and anticipated rail systems research activities and recommendations for inclusion of documents in the series of technical translations under preparation by FRA.

PERFORMING AGENCY: Princeton University Department of Civil and Geological Engineering
INVESTIGATOR: Kerr, AD (Tel. 609-452-5424)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Dec. 1974
COMPLETION DATE: Dec. 1975 TOTAL FUNDS: $ 82555 Contract DOT-TSC-900

ACKNOWLEDGMENT: FRA

01 058305
NONDESTRUCTIVE MEASUREMENT OF LONGITUDINAL RAIL STRESSES
The work under this contract has dual objectives. One is the study of the effect of applied stress on the propogation of ultrasonic pulses in high-carbon, railroad-quality rail steel. This shall be accomplished by an analysis of appropriate wave equations with the non-linear elastic constants included, plus experimental work to compare with the predicted results. The second objective shall be to initiate research utilizing ultrasonic pulses that will result in techniques adaptable to the in-situ measurement of longitudinal stresses in rail via a test car moving at standard operating speeds. Measurement of these stresses will enable operating railroads to locate highly stressed areas in rail.

PERFORMING AGENCY: Oklahoma University, School of Aerospace, Mechanical and Nuclear Engineering
INVESTIGATOR: Engle, DM (Tel. 405-325-7241)
SPONSORING AGENCY: Department of Transportation
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1974
COMPLETION DATE: June 1976 TOTAL FUNDS: $ 100000 Contract DOT-OS-40091

ACKNOWLEDGMENT: FRA

01 058306
STATE-OF-THE-ART SURVEY: RAIL JOINING METHODS
Research and review existing, as well as potential, rail joining methods with the aim of weighing the strengths and weaknesses of each. Also areas are to be identified where further research and development efforts could lead to cost and/or performance improvements in joining rails.

Research for this project was also performed by Metals and Ceramics Information Center of the Defense Supply Agency.

PERFORMING AGENCY: Department of Defense, Defense Supply Agency
INVESTIGATOR: McNeill, JD (Tel. 513-296-6310)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974
COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 43390

ACKNOWLEDGMENT: FRA

01 058307
RAIL INSPECTION SYSTEMS ANALYSIS AND TECHNOLOGY ASSESSMENT
Study of economic and operational aspects of rail inspection systems and an assessment of the state-of-the- art rail inspection technology.

PERFORMING AGENCY: Battelle Columbus Laboratories
INVESTIGATOR: Meacham, HC (Tel. 614-299-3151)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
COMPLETION DATE: July 1976 TOTAL FUNDS: $ 149202 Contract DOT-TSC-979

ACKNOWLEDGMENT: FRA

01 081797
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 1—TRACK STRUCTURES

Task objectives are development of recommended performance specifications and maintenance and geometric design guidelines for conventional railroad track and related track structures and components. This activity is intended to quantify the adequacy of a guideway that yeilds an acceptable level of ride quality and safety with minimization of first cost, maintenance costs, and secondary costs such as loss and damage, and wear and fatigue to vehicles. Task will recognize that load environment is a function of track parameters, wheel load, and level of maintenance. Task will utilize both field tests and tests performed on the rolling load track test facility currently being developed and constructed by AAR. Task will also include sensitivity studies of track parameters utilizing dynamic simulation models developed during Track Train Dynamics, Phase I.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Martin, GC (Tel. 312-225-9600 Ext 877), Lundgun, J (Tel. 312-225-9600 Ext 877)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

01 109019
DEFORMATIONS UNDER RAIL TRACK STRUCTURE AND SUPPORT

The study of the stresses and deformations under dynamic and static load systems in railway track structure and support is being undertaken. Initially, the geotechnical properties of ballast and sub-ballast are being studied. A 25 ft. length of full scale track is now being built for testing in the laboratories.

PERFORMING AGENCY: Queen's University, Canada 2.22
INVESTIGATOR: Raymond, GP Batchelor, B Gaskin, PN Davies, JR Dalen, KB Svec, O
SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1971
COMPLETION DATE: May 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 045823
TRACK TRAIN DYNAMICS RESEARCH PROGRAM, PHASE I
The objective of this contract as part of the Track Train Dynamics Research Program is to develop a better understanding of the dynamic interrelationships between the moving train and the fixed guideway structure on which it operates. This understanding will result in the development of techniques for improved train handling and train make-up. Authoritative guidelines for train handling and train make-up will be established, providing better performance and thus increasing time reliability of rail freight transportation. A train handling plan or matrix, incorporating combinations of key parameters, will be prepared, and it then will be available for use by each railroad to suit its operations.

PERFORMING AGENCY: Association of American Railroads
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Peterson, LA (Tel. 202-426-2965)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1973 COMPLETION DATE: June 1975 TOTAL FUNDS: $ 418618 Contract DOT-FR-40011 (CR)

ACKNOWLEDGMENT: FRA

02 048781
INTEGRATE COMPUTER SYSTEM NETWORK (ICSN)
Contractor will furnish and Integrated Computer System Network (ICSN) which will be instrumental in providing the degree of simulation fidelity required for the variety of dynamic situations to be investigated within the Wheel/Rail Dyanmic Laboratory.

PERFORMING AGENCY: Datacom, Incorporated
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Eckland, J (Tel. 202-4261227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1974 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 1651282 Contract DOT-FR-40009

ACKNOWLEDGMENT: FRA (PR# 74-02-1-2-3-4-5)

02 048943
IMPROVED WHEEL AND RAIL PERFORMANCE VIA CONTROL OF CONTACT STRESS
The Contractor shall extend the general analysis he has developed ('Singh and Paul' analysis) to the conformal wheel rail case. This effort shall be in a manner generally consistent with the work outlined in the contractor's proposal 'Improved Wheel and Rail Performance via Control of Contact Stress,' dated September 28, 1973,with attachments documenting the existing Singh/Paul analysis.

PERFORMING AGENCY: Trustees of the University of Pennsylvania Office of Research Administration
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 29442 Contract DOT-OS-40093

ACKNOWLEDGMENT: Office of Systems Development and Technology

02 054696
DYNAMICS OF FREIGHT TRAINS
A mathematical model has been developed for investigating the dynamic stability of cars in long freight trains and appears able to predict accurately the stability characteristics of a specific container car employed by Canadian National Railways for which dynamic stability data are available. Groups of up to sixteen cars were investigated, and the results indicate that the range of train velocities for which a long freight train will exhibit stable behavior can apparently be determined with satisfactory accuracy by consideration of individual cars free of coupling forces. The model includes the effects of creep and spin forces at the rail-wheel interface, and a consideration of spin forces was found to be important. It is possible to define an optimum value of lozenge stiffness for which the freight-car trucks would be stable as regards hunting for all speed of interest for freight trains.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 2.8
INVESTIGATOR: Kurtz, EF
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

02 055812
FREIGHT CAR DYNAMICS RESEARCH PROGRAM
The contractor shall address the following objectives in carrying out the program. 1. develop mathematical models that may be used to understand the dynamic behavior of freight cars and the effects of various truck, car and track design parameters on this behavior. 2. validate these models with data gathered by the AAR-RPI-FRA Train-Track Dynamics Program, and the SP Truck Research Program. 3. utilize the models developed to examine current vehicle and track maintenance procedures and to suggest amendments to the procedures. 4. utilize the models to suggest conceptual design improvement and modifications for current trucks and to suggest alternative truck designs.

PERFORMING AGENCY: Clemson University Department of Engineering
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 COMPLETION DATE: May 1975 TOTAL FUNDS: $ 57632 Contract DOT-OS-40018

ACKNOWLEDGMENT: Office of Systems Development and Technology/OST (PR DOT-OS-40018)

02 055835
ENGINEERING DATA ON RAIL SYSTEM DYNAMICS
The efforts of the contractor are expected to result in: 1- A computer program to be operational on TSC equipment for predicting the forces and tracking errors of a slowly moving rail car negotiating curves and traveling over track with specified track irregularitiies and alignment variations. 2 -Analytical tools and computations subroutines routines for extension of linearized model response programs existing at TSC for predicting rail vehicle vibration and track forces in response to statistical and deterministic descriptions of track geometry and track irregularities to include the influence of significant rail system non-linearities. 3- definition of Test Requirements for validation of the analysis tools developed above for prediction of rail system dynamics.

PERFORMING AGENCY: Clemson University
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1974 COMPLETION DATE: Aug. 1975 TOTAL FUNDS: $ 56000 Contract DOT-TSC-902

ACKNOWLEDGMENT: TSC (PR# TMP-0193 & A)

02 058257
TRACK-TRAIN DYNAMICS RESEARCH PROGRAM, PHASE II
In a joint international Government-industry program, the Federal Railroad Administration in cooperation with the Association of American Railroads, the Railway Progress Institute, and the Canadian Transportation Development Agency has undertaken a ten-year comprehensive Track-Train Dynamics Research Program to develop a better understanding of the kinematics of railroad performance. This joint research effort is divided into three phases, the first of which has entailed the collection and analysis of data that is necessary to define quantitatively the characteristics of the present railroad system in North America. In the second phase (3 years) this data is to be applied to the development of requirements and interim performance specifications that will lead eventually to the development of improved equipment in the third (5 years) phase of the program. Initially in Phase II investigations will be conducted in the following areas: track structures, wheel-rail contact, trucks and suspension, carbody, couplers and draft gear and the brake system. The descriptive data in this research listing pertains only to that portion of the overall

program that is sponsored by the Federal Railroad Administration. This support amounts to approximately one-third of the total resources dedicated to the TTD Research Program.

PERFORMING AGENCY: Association of American Railroads
INVESTIGATOR: Sutliff, DR (Tel. 312-225-9600)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Peterson, LA (Tel. 202-426-2965)

STATUS: Proposed NOTICE DATE: Feb. 1975 START DATE: July 1975 COMPLETION DATE: June 1978 TOTAL FUNDS: $ 1700000

ACKNOWLEDGMENT: FRA

02 058258
RAIL DYNAMICS SIMULATOR COMMUNICATION SYSTEM FOR U. S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY

The U. S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Rail Dynamics Simulator (RDS) at the Transportation Test Center, Pueblo, Colorado. The RDS consisting of several systems, including the communication system, will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions. The communication system provides short-range voice communications among RDL operations personnel and consists of a fixed communication station in the RDL control room combined with portable communication units installed within hard hats worn by test personnel. The communication system contractor is responsible to: (1) design, fabricate, test, install and checkout hardware which meets the performance specification, (2) provide documentation in accordance with the contract, (3) communicate interface definitions with other RDS systems to the Government and (4) provide a system training program. The overall communication system design is essentially complete and in-plant testing has begun. The system is to be delivered, installed and checked out early in 1975.

PERFORMING AGENCY: Reaction Instruments, Incorporated
INVESTIGATOR: Kolsrud, J (Tel. 703-893-3930)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel. 202-755-1877)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1974 COMPLETION DATE: May 1975 TOTAL FUNDS: $ 144000 Contract DOT-FR-40018

ACKNOWLEDGMENT: FRA

02 058259
RAIL DYNAMICS SIMULATOR DRIVE TRAIN SYSTEM FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY

The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Rail Dynamics Simulator (RDS) at the Transportation Test Center, Pueblo, Colorado. The RDS consisting of several systems, including the drive train system, will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions. The drive train system consisting of 600 hp DC motors, flywheels, power supplies, controls, etc. provides the RDS with the following capabilities: simulation of vehicle inertia, rotation of unpowered vehicle wheelsets, absorption of power from self-powered vehicles to simulate air drag and drawgear effects, simulation of longitudinal rail stiffness and simulation of emergency braking. The drive train contractor is responsible to: (1) design, fabricate, test, install and checkout hardware which meets the performance specification, (2) provide documentation in accordance with the contract, (3) couumnicate interface definitions with other RDS systems to the Government and (4) provide a system training program. The contractor has successfully completed in-plant testing of the drive train system and the system has been delivered to the RDL for future installation with other RDS systems.

PERFORMING AGENCY: General Electric Company Drive Systems Product Department
INVESTIGATOR: Muller, G (Tel. 703-389-7011 Ext 119)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel. 202-755-1877)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1972 COMPLETION DATE: Feb. 1976 TOTAL FUNDS: $ 2701000 Contract DOT-FR-20016

ACKNOWLEDGMENT: FRA

02 058260
RAIL DYNAMICS SIMULATOR CARRIAGE ASSEMBLIES, REACTION STRUCTURES AND SERVICE STRUCTURE FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY

The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Rail Dynamics Simulator (RDS) at the Transportation Test Center, Pueblo, Colorado. The RDS consisting of several systems, including the carriage assemblies, reaction structures and service structure (CARSSS) system, will be used in research, development, testing, and other activities associated with railroad vehicle wheel/track interactions. The CARSSS houses hydraulic power supplies to energize the RDS track actuators and forms a structural framework that consists of large steel and concrete masses which react to forces generated by the test vehicle, and the vertical and lateral actuators of the RDS system. The CARSSS contractor is responsible to: (1) design, fabricate, test, install, and checkout hardware which meets the performance specification, (2) provide documentation in accordance with the contract, (3) communicate interface definitions with other RDS systems to the Government and (4) provide a system training program. Approval of the final CARSSS design is expected early in 1975. Some hardware fabrication is currently underway.

PERFORMING AGENCY: Boeing Company, Boeing Aerospace Company
INVESTIGATOR: Carter, A (Tel. 206-655-9381)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel. 202-755-1877)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973 COMPLETION DATE: July 1976 TOTAL FUNDS: $ 5400000 Contract DOT-FR-30068

ACKNOWLEDGMENT: FRA

02 058261
RAIL DYNAMICS SIMULATOR TRACK MODULE SYSTEM FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY

The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Rail Dynamics Simulator (RDS) at the Transportation Test Center, Pueblo, Colorado. The RDS consisting of several systems, including the track module system, will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions. The track modules include platform-mounted rollers supported by servo-actuators under the control of an on-line computer system. The rollers simulate track and support the wheels of the test vehicle. The track module contractor is responsible to: (1) design, fabricate, test, install and checkout hardware which meets the performance specification, (2) provide documentation in accordance with the contract, (3) communicate interface definitions with other RDS systems to the Government and (4) provide a system training program. The final track module design is to be completed in early 1975. Some long lead items have been released for purchase and hardware fabrication is to start once design is approved.

PERFORMING AGENCY: Gulf and Western Industries, Incorporated, Advanced Development and Engineering Center
INVESTIGATOR: Niemkiewicz, J (Tel. 215-544-7600)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel. 202-755-1877)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1973 COMPLETION DATE: Apr. 1977 TOTAL FUNDS: $ 2413000 Contract DOT-FR-20033

ACKNOWLEDGMENT: FRA

02 058262
RAIL DYNAMICS SIMULATOR ANALOG DATA ACQUISITION AND CONTROL SYSTEM FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY
The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Rail Dynamics Simulator (RDS) at the Transportation Test Center, Pueblo, Colorado. The RDS consisting of several systems, including the analog data acquisition and control system (ADACS), will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions. The ADACS is utilized to obtain vehicle test data and to provide analog control of the RDS. The ADACS contractor is responsible to: (1) design, fabricate, test, install and checkout hardware which meets the performance specification, (2) provide documentation in accordance with the contract, (3) communicate interface definitions with other RDS systems to the Government and (4) provide a system training program. Overal ADACS design is essentially complete and in-plant testing is in progress at the contractor's facility. ADACS is expected to be operational at the RDL in early 1975.

PERFORMING AGENCY: EDMAC Associates, Incorporated
INVESTIGATOR: Mimken, F (Tel. 716-385-1440)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel. 202-755-1877)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Dec. 1973 COMPLETION DATE: May 1975 TOTAL FUNDS: $ 1069000 Contract DOT-FR-40001

ACKNOWLEDGMENT: FRA

02 058263
U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY SYSTEMS ENGINEER AND TECHNICAL MONITOR
The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Rail Dynamics Simulator (RDS) and a vertical shaker at the Transportation Test Center, Pueblo, Colorado. The RDL will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions. The responsibilities of the RDL Systems engineers are as follows: (1) develop RDL/RDS subsystem specifications, (2) monitor design, fabrication, in-plant test and installation, (3) coordinate subsystem interfaces, (4) provide integration documentation, (5) provide acceptance software, (6) provide simulator training program, (7) direct acceptance testing, and (8) provide vertical shaker. The Systems Engineer Contract progress is as follows: (1) continuing technical management monitoring of the RDS subsystems which include drive trains, track modules, carriage assemblies, reaction structures and service structure, communication system, analog data acquisition and control system, and integrated computer system network, (2) vertical shaker manufactured and installed in the RDL with checkout and acceptance tests scheduled in early 1975.

PERFORMING AGENCY: Wyle Laboratories, Eastern Operations Colorado Springs Facility
INVESTIGATOR: de Benedet, D (Tel. 303-597-4500)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel. 202-755-1877)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1973 COMPLETION DATE: July 1977 TOTAL FUNDS: $ 6785000 Contract DOT-FR-30045

ACKNOWLEDGMENT: FRA

02 058264
RAIL DYNAMICS SIMULATOR INTEGRATED COMPUTER SYSTEM NETWORK FOR U.S. DEPARTMENT OF TRANSPORTATION RAIL DYNAMICS LABORATORY
The U.S. Department of Transportation Rail Dynamics Laboratory (RDL) will house the Rail Dynamics Simulator (RDS) at the Transportation Test Center, Pueblo, Colorado. The RDS consisting of several systems, including the Integrated Computer System Network (ICSN), will be used in research, development, testing and other activities associated with railroad vehicle wheel/track interactions. The ICSN utilizing five minicomputers and associated peripheral devices is designed to excite, control, monitor and acquire data from other parts of the RDS. The ICSN contractor is responsible to: (1) design, fabricate, test, install and checkout hardware which meets the performance specification, (2) provide documentation in accordance with the contract, (3) communicate interface definitions with other RDS systems to the Government and (4) provide a system training program. The ICSN design is essentially complete and in-plant testing is underway on two of the five minicomputer systems.

PERFORMING AGENCY: DATACOM, Incorporated
INVESTIGATOR: Andrews, B (Tel. 904-244-6121)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Olekszyk, P (Tel. 202-755-1877)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1974 COMPLETION DATE: June 1975 TOTAL FUNDS: $ 1653000 Contract DOT-FR-40009

ACKNOWLEDGMENT: FRA

02 058265
RAILROAD EQUIPMENT RIDE QUALITY ANALYSIS
This project will determine ride quality characteristics of various designs of railroad equipment trucks by means of computer simulation.

PERFORMING AGENCY: Battelle Memorial Institute
INVESTIGATOR: Meekum, H (Tel. 614-299-3151)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel. 202-426-9655)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975 COMPLETION DATE: Dec. 1975 TOTAL FUNDS: $ 45000 Contract DOT-FR-20077

ACKNOWLEDGMENT: FRA

02 058303
FREIGHT CAR TRUCK DESIGN OPTIMIZATION
The Truck Design Optimization Project (TDOP) is a multiyear project intended to evaluate performance characteristics of existing railroad freight car trucks; determine through cost-benefit analysis the feasibility of improving truck performance by mechanical modification of existing type trucks or technical introduction of new truck designs that respect carbody/suspension system interfaces or are otherwise compatible with existing freight train systems; provide performance and testing specifications for use in the development of freight car suspension systems, and study concepts of integrated carbody support systems and advanced designs in anticipation of future railroad requirements.

PERFORMING AGENCY: Southern Pacific Transportation Company
INVESTIGATOR: Byrne, R (Tel. 415-362-1212X-22547)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel. 202-426-0855)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Dec. 1977 TOTAL FUNDS: $ 1325255 Contract DOT-FR-40023

ACKNOWLEDGMENT: FRA

02 080320
DIRECT RECORDING OF RAIL-WHEEL PARAMETERS
A test rig is being subjected to lateral displacement to measure the vertical movement of the centre of worn wheelsets on worn track to determine the gravitational stiffness related ride and stability characteristics of rail cars.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 2.23.73
INVESTIGATOR: Blader, FB
SPONSORING AGENCY: Canadian National Railways, Canadian Pacific, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1973 COMPLETION DATE: Jan. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 080321
TRACK DYNAMICS DATA ACQUISITION SYSTEM
The design, construction and testing of an instrumented system for high speed (32 KBITS) acquisition of data on computer formatted magnetic tape on motion of the track and roadbed subjected to train loads is being carried out to provide essential data for improved design of both track and rolling stock.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 2.9
INVESTIGATOR: Corneil, ER
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada Queen's University, Canada
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974 COMPLETION DATE: Apr. 1975
ACKNOWLEDGMENT: Roads and Transportation Association of Canada

02 081789
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I
This international program has as its objective the perfecting of the operating efficiency and safety of railroad equipment. The purpose of the ten-year program is to study the various stresses which affect rolling stock and track and the damage they cause; to establish performance specifications that would enable suppliers to manufacture the strongest, most efficient equipment possible. The emphasis in this phase has been toward developing corrective measures which could be quickly adopted by the railroads to correct problems in train phenomena with primary emphasis on employee education. The goal in this phase has been not only generation of new information, but the organization of approaches toward its effective utilization. Phase II (1975-1977) is directed at taking the load environment and train action forces in railroad operations, established in Phase I, and using these as the basis for performance specifications for equipment with increased dynamic stability. Phase III (1977-1982) is to see application of more advanced scientific principles to railroad track, equipment and operations to improve dynamic stability.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Lind, EF (Tel. 312-225-9600 Ext 866)
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1972 COMPLETION DATE: 1975 TOTAL FUNDS: $ 4000000
ACKNOWLEDGMENT: AAR

02 081790
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 2—DEVELOP QUANTITATIVE TRAIN HANDLING PROCEDURES
The final matrix has been developed on which computer runs will be based. The matrix gives a detailed description of each run and refers the run to specific sections of the AAR Publication, "Track Train Dynamics To Improve Freight Train Performance." This matrix suggest comparisons to be made between various runs by linking them for the purpose of procedural analysis. This will make possible better methods of train handling and will make evident any hazards of alternative handling techniques. The Train Performance Calculator (TPC) has been used to verify and correct the known grades to determine continuous speeds. As the task progresses, more computer simulations may be needed to add runs not described in the matrix; it may also be possible to delete others. A second activity of Task 11 is organization of representative data into a convenient and useful format to be used for further investigation of train make-up with respect track train dynamics.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Lind, EF (Tel. 312-225-9600 Ext 866)
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1972 COMPLETION DATE: 1975
ACKNOWLEDGMENT: AAR

02 081791
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 4—ENGINEMEN'S SENSITIVITY ANALYSIS AND TRAIN HANDLING AIDS
The short-term objectives of this task are the development of train handling aids which could display visually to the engineman the distribution of the mass in his train and give some indication of the force levels as they develop; the subsequent testing of prototype instrumentation; and ultimately a means of comparing different enginemen and evaluating train handling at various skill levels. Long- term, the objectives are to (1) evaluate the enginemen's sensitivity to forces in the train by measuring the forces and the operator's response; (2) consider increasing the enginemen's sensitivity to the dynamics of his train by training or otherwise; (3) compare the various skill groups attending to the differences in train behavior, speed and motion cues. Devices already developed include the Train Mass Distribution Graph, a chart which provides a simple visual representation of the loaded and empty cars in a train and relative weights of the cars, developed by Transportation Systems Center; A Power Consist Force Display, giving enginemen a display of draft and buff forces generated by a locomotive consist and developed by Electro-Motive Division; the Draft-Buff Indicator, developed by Transportation Systems Center to portray development of potential violent car shocks in trains; and a Single-Point Slack Telemetry System, refinement of which has been postponed. An Independent Brake Monitor has been designed to record use of locomotive brakes above a preselected speed. Field testing by several railroads of the instrumentation has been under way.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Lind, EF (Tel. 312-225-9600 Ext 866)
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1973 COMPLETION DATE: 1975
ACKNOWLEDGMENT: AAR

02 081793
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 7—MATHEMATICAL MODELING
Computer programs under this task are nearing completion with validation, documentation and parameter investigations remaining to be completed. Involved are the Simplified Train Action Model; Detailed Train Action Model; Detailed Simplified Train Action Model (Purdue University); Quasi-Static Lateral Train Stability Model (Electro-Motive Division); Detailed Lateral Train Stability Model; Detailed Vertical Train Stability Model (Pullman-Standard); Braking Model (Westinghouse Air Brake); Equipment Model—Locomotive (General Electric); Equipment Model—Vehicle; Truck Models (Electro-Motive Division); Lateral-to-Vertical Ratio Model; Vehicle Transfer Function; Lateral Track Stability Model (AAR); Curve Entry Model (Electro-Motive Division); Simulation of Cushioning Characteristics (Keystone Railway Equipment); and Pre- and Post-Processor (McDonnel Douglas Automation Co.).

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration, Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Lind, EF (Tel. 312-225-9600 Ext 866)
STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1972 COMPLETION DATE: 1975
ACKNOWLEDGMENT: AAR

02 081794
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 8—COMPONENT CHARACTERISTICS
The Track Train Dynamic Analysis and Test Program is being performed on a contract funded by the Department of Transportation, administered by the National Aeronautics and Space Administration, Marshall Space Flight Center, and conducted by the Denver Division of Martin Marietta Corp. The work is a coordinated analytical and test program with the goal of developing experimentally, with analytical correlation, a definition of the dynamic properties of a truck/car system suitable for use in dynamic analysis of curving, hunting and response to track irregularities and to the interaction mechansims which exist between the wheel and the rail. The result is expected to be a procedure for generation of analytical models of the car/truck system and procedures and techniques for future test efforts by which additional configurations can be evaluated experimentally.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Lind, EF (Tel. 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1972
COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

02 081795
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 9—INSTRUMENTATION AND TESTING
Tests have been conducted on Southern Railway to determine draft gear, end-of-car cushioning and sliding-sill characteristics in support of Task 8. Tests have been made on Union Pacific Railroad by Battelle Memorial Institute to investigate the wide-gage phenomena, determining the effects of tonnage and seasonal changes. Field validation of several mathematical models has been under way at the Pueblo Test Center. Field validation of the Pullman-Standard Vertical Stability Model has been completed.

PERFORMING AGENCY: Association of American Railroads Research Center
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Lind, EF (Tel. 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1972
COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

02 081796
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II
The objectives of this program are the development of recommended performance specifications and design guidelines for railroad freight cars, track structures, and their components and subsystems. Performance specifications are to coincide with the demands of the dynamic operating environment to which such systems are subjected. Details of methods and scope are included under specific task references.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Sutliff, DR (Tel. 312-225-9600 X-1463), Hawthorne, KL (Tel. 312-255-9600 X-1463), Martin, GC (Tel. 312-225-9600 X-1463)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 00 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081799
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 2—WHEEL/RAIL
Overall task goals are to improve knowledge of the mechanics of wheel/rail interactions and to establish recommended performance specifications and design guidelines for wheels and rail. Task will involve applied research in wheel and rail metallurgy in order to determine requirements for improved performance. Research will also be conducted in stress analysis and fracture mechanics with the goal of developing improved design techniques and life cycle prediction methods. Stress analysis will especially concentrate on the contact stresses at the wheel/rail interface. Wear research conducted under Task 9, Advanced Analytical Techniques, will supply important input to this task.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Martin, GC (Tel. 312-225-9600 Ext 877), Kucera, W (Tel. 312-225-9600 Ext 877), Stone, DH (Tel. 312-225-9600 Ext 877)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081803
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 7—TEST MANAGEMENT
Task objectives is to coordinate and conduct such tests as are necessary for the pursuit of Tasks 1-6 of Track Train Dynamics, Phase II. Task will provide clearinghouse function for data requests and will design and conduct appropriate laboratory and field tests.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Martin, GC (Tel. 312-225-9600 Ext 877)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active START DATE: Jan. 1975 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081804
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 9—ADVANCED ANALYTICAL TECHNIQUES
Task objective is to assure that Track Train Dynamics-Phase II, Tasks 1-6 are equipped with the latest advances in applicable analytical techniques. Task will essentially be performed through contract efforts in such areas as stress analysis, fracture mechanics, and wear properties of ferrous materials.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Martin, GC (Tel. 312-225-9600 Ext 877), Meyar, GJ (Tel. 312-225-9600 Ext 877)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

02 081805

INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 8—PROGRAM ANALYSIS

The objective of this task is to assure economic justification of recommendations which result from research activities conducted in Tasks 1-6 of Phase II of the Track Train Dynamics Program. Task will include prior evaluation of research and implementation strategies to forecast potential economic benefits as an aid to priority determination. Areas selected for priority determination will be selected by program management. The principal technique for priority determination will be lifecycle costing based on data accumulated through existing industry channels supplemented by field surveys. Task will supply economic justification package for final recommendations based on industry status and forecasts and time of release.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Hawthorne, KL (Tel. 312-225-9600 Ext 862)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

03 016867
DEMONSTRATE TWO TRAIN SETS OF DUAL-POWER GAS TURBINE ELECTRIC POWERED COMMUTER RAILROAD CARS
No Abstract.

PERFORMING AGENCY: New York Metropolitan Transit Authority
INVESTIGATOR: Raskin, D (Tel. 212-262-6900)
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Silien, JS (Tel. 202-4260090)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Dec. 1971
COMPLETION DATE: Dec. 1976 TOTAL FUNDS: $ 7400000 Grant DOT-UT-613

ACKNOWLEDGMENT: UMTA (NY-06-0005)

03 025403
URBAN RAPID RAIL VEHICLE SYSTEMS PROGRAM
To enhance the attractiveness of rapid rail transportation to the urban traveler by providing existing and proposed transit systems with service that is comfortable, reliable, safe, and as economical as possible. Short range goals: Demonstration of the state-of-the-art in rapid rail vehicular technology. Long range goals: Development and demonstration of improved vehicles.

PERFORMING AGENCY: Boeing Company Vertol Division
INVESTIGATOR: Hervey, D (Tel. 215-5223200)
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Silien, JS (Tel. 202-4260090)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1971
TOTAL FUNDS: $ 12322624 Contract DOT-UT-10007

ACKNOWLEDGMENT: UMTA (IT-06-0026)

03 036771
METRO IMPROVEMENT
In order to determine why the Metroliner has not performed as originally planned and to assume a role of leadership in the future development of this type equipment, work is to be performed to correct the Metroliner reliability problems and to make necessary modifications and improvements based upon operating experience. Investigation and train modifications based upon will be conducted. It is anticipated that the engineering effort and the modification work will require two years to complete.

PERFORMING AGENCY: General Electric Company
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel. 65)

STATUS: Active NOTICE DATE: Feb. 1975 COMPLETION DATE: June 1975
TOTAL FUNDS: $ 4241344 Contract DOT-FR-10037

ACKNOWLEDGMENT: FRA

03 036986
ADVANCED DESIGN TECHNIQUES FOR RAIL TRANSPORTATION VEHICLES
The contractor shall develop an analytical model suitable for simulating the structural action of typical rail transportation vehicle components with sufficiently high degrees of precision to permit realistic evaluation of their expected fatigue life. Emphasis shall be on estimation of stress levels near points of singularity such as cutouts, stiffeners and support attachments. This model shall be based on the results of recent research on the part of the contractor and others which indicates that a family of finite elements, exhibiting convergence with respect to increasing orders of approximation as well as with respect to progressively reduced element sizes, can be constructed utilizing a new formulation technique known as the constraint method.

PERFORMING AGENCY: Washington University, St Louis
INVESTIGATOR: Szabo, B (Tel. 314-863-0100 X-4123)
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Levine, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1973
COMPLETION DATE: June 1976 TOTAL FUNDS: $ 84400 Contract DOT-OS-30108

ACKNOWLEDGMENT: Office of Systems Development and Technology

03 038060
FLAW DETECTION IN RAILWAY WHEELS USING ACOUSTIC SIGNATURES
Phase I involves testing for defect identification by continuous static excitation. Methods and equipment for finding defects shall be developed. Phase II shall use the methods and facilities developed in Phase I to study the acoustic signatures of a variety of railroad wheel designs, sizes and typical flaws.

PERFORMING AGENCY: Houston University
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Levine, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Oct. 1972
COMPLETION DATE: Oct. 1974 TOTAL FUNDS: $ 115573 Contract DOT-TSC-729

ACKNOWLEDGMENT: TSC (DOT-FR-30002)

03 038061
RAIL HAZARDOUS MATERIAL TANK CAR DESIGN STUDY
The objectives of the study are: (1) to provide the basis for defining practical and economical safety improvements which can be either retrofitted to in-service cars or incorporated into the design and manufacture of new tank cars, and (2) define the safety research gaps which must be remedied before a prototype tank car can be designed to optimal safety/economic considerations.

PERFORMING AGENCY: Calspan Corporation
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Dancer, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Oct. 1972
COMPLETION DATE: Mar. 1975 TOTAL FUNDS: $ 94555 Contract DOT-FR-20069 (CPFF)

ACKNOWLEDGMENT: FRA

03 038826
PERFORM POST ACCEPTANCE TEST ON THE STATE-OF-THE-ART CAR (SOAC)
The Ground Systems Division of the Transportation Systems Center, which is acting as Systems Manager for the Rail Programs Branch of UMTA in certain research, development and demonstration areas, is funding this contract for the twofold purpose: to perform post acceptance engineering test on the State-of-the-Art Car and to expand and improve the General Vehicle Test Plan. Both of these objectives are in furtherance of the Urban Rail Supporting Technology Program and more specifically will: provide engineering data for the Advanced Concepts Train Programs, provide UMTA with an engineering baseline to judge future program progress, relate HSGTC track characteristics to those of 5 model areas, and provide an instrumentation package that can be used on railcar test programs, including the AC Train.

PERFORMING AGENCY: Boeing Company
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Neat, G (Tel. 617-4942290)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE; Feb. 1973
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 496001 Contract DOT-TSC-580 (CPFF)

ACKNOWLEDGMENT: TSC (PR# PE-0082)

03 038849
IMPROVE METROLINER TRUCKS
The objective of this contract is to design, fabricate, test, integrate and railcar test improved Metroliner trucks. Phases I and II, Prototype (4). Phase II, Fleet trucks (96).

PERFORMING AGENCY: LTV Aerospace Corporation Ground Transportation Division/
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel. 202-426-9665)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1973
COMPLETION DATE: Mar. 1976 TOTAL FUNDS: $ 3784869 Contract DOT-FR-20049 (FFP)

ACKNOWLEDGMENT: Federal Railraod Administration

03 045009
STRUCTURAL STUDY OF HAZARDOUS MATERIAL TANK CARS
The ojectives of this research can be accomplished in three phases. The first phase shall be concerned with a review and evaluation of present specifications under which tank cars are currently being built. A study of the forces which tank cars are normally subjected to in service conditions will be part of this study. The next two phases are inter-related with one being an experimental study of a scale model one fourth or one fifth of a 112A 340W type tank car and the other being a theoretical analysis of a full scale tank car of the type 112A 340W using realistic thermal loads obtained from fire tests and analysis of fire accidents.

PERFORMING AGENCY: Louisiana Polytechnic Institute
INVESTIGATOR: Wilkinson, M
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Levine, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1973 COMPLETION DATE: May 1974 TOTAL FUNDS: $ 49000 Contract DOT-FR-30056 (CR)

ACKNOWLEDGMENT: FRA

03 045693
FRACTURE RESISTANCE CHARACTERISTICS OF RAILROAD WHEELS
Tasks include: 1-Carry out plane strain crack toughness (K1c) tests on specimens removed from the rim, plate, or hub locations of railroad wheels. 2-Evaluate fatigue crack propagation in railroad wheels and correlate fatigue crack growth rate with the range of the stress intensity factor. 3-Establish conventional tensile, hardness, and impact toughness mechanical properties of railroad wheels. 4- Present and analyze fracture toughness (K1c) & fatigue test data and attempt determination of critical crack size that will cause wheel fracture for different stress levels.

PERFORMING AGENCY: Boeing Company, Boeing Aerospace Company
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Valente, RE (Tel. 617-4942146)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1973 COMPLETION DATE: Jan. 1975 TOTAL FUNDS: $ 61380 Contract DOT-TSC-617 (CPFF)

ACKNOWLEDGMENT: TSC

03 045708
CRASHWORTHINESS OF URBAN RAIL CARS
The results of the project are to include: 1. Definition of crashworthiness criteria for Urban Rail Systems. 2. Assessment of the crashworthiness of existing Urban Rail Vehicles. 3. Indentification, analysis and assessment of state-of-the-art of crash energy management devices that can be retrofitted to existing vehicle designs. 4. Design Tradeoff Studies of improved structural designs in terms of passenger safety risks, vehicle weight and cost. 5. Engineering standards for Rail Rapid Transit Vehicle Crashworthiness.

PERFORMING AGENCY: Calspan Corporation
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Weinstock, H (Tel. 617-4942038)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Aug. 1973 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 151831 Contract DOT-TSC-681 (CPFF)

ACKNOWLEDGMENT: TSC

03 045874
PRODUCTION OF THE IMPROVED METROLINER TRUCKS
Task Order 3 is herewith assigned for engineering support on an as-required basis for the production of the improved Metroliner trucks. Support shall include but not be limited to engineering evaluation, monitoring of dynamic analysis, and/or truck manufacture and testing, review of transformer mount modifications, carbody modification and/or supporting design fabrication and related testing.

PERFORMING AGENCY: Budd Company Systems Technology D
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Swerdlow, C (Tel. 202-4262970)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 257017 Contract DOT-FR-10035

ACKNOWLEDGMENT: FRA (PR# 73-90-1)

03 046502
RAILROAD WHEEL INVESTIGATION
An analytical elastic solution to determine the stresses developed in a railway car wheel when subjected to axisymmetric heating is being used to evaluate different geometric designs. Experimental determination of the temperatures developed on the tread of a car wheel are being examined to evaluate the effect of brake shoe geometry.

PERFORMING AGENCY: Illinois University, Urbana, Department of Theoretical and Applied Mechanics
INVESTIGATOR: Wetenkamp, HR
SPONSORING AGENCY: Griffin Wheel Company

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1971 COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (JGF 25)

03 048945
STUDY OF CRITERIA AND TECHNOLOGY FOR THE DESIGN OF SHELF COUPLERS
The contractor shall develop, test, and validate a comprehensive mathematical model with two principal capabilities: 1. It shall be suitable for simulating train action during derailment situations that may result in tank head penetration by couplers. 2. The second model segment shall be designed to simulate the structural response of couplers to design loads.

PERFORMING AGENCY: Washington University, St Louis
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1974 COMPLETION DATE: June 1976 TOTAL FUNDS: $ 420000 Contract DOT-OS-40106

ACKNOWLEDGMENT: Office of Systems Development and Technology

03 050338
ARTICULATED RAIL CAR TRUCK DEVELOPMENT
Develop a dramatically improved freight car truck. Obtain background information for applying basic design to (a) locomotives; (b) rapid-transit cars, and (c) passenger cars.

Design, build, and test a 100 ton capacity car set of trucks based on earlier work with 1/8 size scale models and a continuing work with mathematical models (computer simulation).

Low speed testing over switching railroad trackage indicates that basic design and principles are sound. Plans being made for further testing for longer distances and at higher speeds.

REFERENCES:
AN EVALUATION OF RECENT DEVELOPMENTS IN RAIL CAR TRUCK DESIGN, List, HA, ASME #71-RR-1, Apr. 1971, RRIS #050340-No 7401

PERFORMING AGENCY: Railway Engineering Associates, Incorporated
SPONSORING AGENCY: Railway Engineering Associates, Incorporated, Philadelphia, Bethlehem and New England Railroad

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1971 COMPLETION DATE: July 1974 In-House

ACKNOWLEDGMENT: Railway Engineering Associates, Incorporated

03 051251
RAILCAR REFRIGERATION GENERATION DEMONSTRATION
Description: This program was initiated to develop a closed Brayton cycle gas turbine engine for mechanical refrigeration of railcars. A breadboard demonstrator was fabricated and operated. A set of components was de-

livered to Pacific Fruit Express and subjected to test on railways around the U.S. A specialized combustor and control system was also delivered to PFE.

PERFORMING AGENCY: AiResearch Manufacturing Company /Garrett Corporation
INVESTIGATOR: Daudet, H
SPONSORING AGENCY: National Science Foundation Division of National and International Programs/

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AQ 945)

03 055604
A STRUCTURAL SURVEY OF CLASSES OF VEHICLES FOR CRASHWORTHINESS
It is the purpose of this contract to provide the technical data required for the evaluation and improvement of the crashworthiness of several classes of rail vehicles as required in the rail safety effort described above. This contract is also to provide preliminary technical data for planning of possible future crashworthiness test efforts.

PERFORMING AGENCY: Boeing Company Vertol Division
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel. 617-4942144)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: May 1976 TOTAL FUNDS: $ 239139 Contract DOT-TSC-856 (CPFF)

ACKNOWLEDGMENT: TSC (PR# TME-0131)

03 055636
RAIL SAFETY/EQUIPMENT CRASHWORTHINESS
The Transportation Systems Center (TSC) is providing technical assistace to the Federal Railroad Administration (FRA) in a program directed at improving railroad safety and efficiency by providing a technological basis for improvement and possible regulation in rail vehicle crashworthiness, inspection of equipment, surveillance of equipment, and other areas. As part of this program TSC is conducting technical analyses of passenger railcar collisions, derailments, and other accidents, directed toward minimizing occupant injuries.

PERFORMING AGENCY: Boeing Company Division of Boeing C
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: Oct. 1975 TOTAL FUNDS: $ 122641 Contract DOT-TSC-821

ACKNOWLEDGMENT: TSC (PR# TME-0117)

03 055774
DEVELOPMENT OF DATA TO IMPROVE DESIGN CRITERIA OF RAILROAD WHEELS
To measure the mechanical loads and thermal gradients due to tread braking on railroad wheels in actual service; to determine the major wheel stresses resulting from these loads and thermal effects; and to develop improved wheel service life criteria.

PERFORMING AGENCY: IIT Research Institute
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: Feb. 1976 TOTAL FUNDS: $ 151977 Contract DOT-TSC-855 (CPFF)

ACKNOWLEDGMENT: TSC (PR# TME-0120)

03 058251
ASSESSMENT OF AUTOMATIC COUPLING SYSTEMS FOR RAILROAD FREIGHT CARS
The objective of this activity is identification, classification, and analysis of all significant concepts in rail freight car coupling systems which offer, through more-nearly automatic operation, a potential for an improvement in safety and overall operational costs compared to present couplers. Tasks include a literature survey, definition of operational characteristics of relevant concepts, preliminary engineering analysis and feasibility study of promising systems, preliminary estimation of life-cycle costs, and preparation of a recommended development plan.

The contract to a performing organization has not yet been awarded.

SPONSORING AGENCY: Transportation Systems Center, Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Hazel, M (Tel. 617-494-2528)

STATUS: Proposed NOTICE DATE: Feb. 1975 START DATE: Sept. 1975
COMPLETION DATE: Apr. 1976

ACKNOWLEDGMENT: FRA

03 058301
RESEARCH OF FREIGHT DAMAGE, WHEEL-RAIL FRICTION AND ENGINE NOISE
The freight damage task consists of three areas (1) identification and description of a freight car system for analysis to yield information for L&D problems faced by industry, (2) modelling of system, and (3) modelling of freight/packaging systems. The wheel-rail friction portion requires setup of a friction-creep test facility with improvements to equipment obtained from General Motors and performing tests to validate test results with previous tests. Engine noise investigations of structural vibration related noise radiation from the GM645E series engine are being performed.

Fifty percent funded by industry (AAR and GM-EMD).

PERFORMING AGENCY: Illinois Institute of Technology
INVESTIGATOR: Kumar, S
SPONSORING AGENCY: Department of Transportation
RESPONSIBLE INDIVIDUAL: O'Sullivan, WB (Tel. 202-426-4377)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1974
COMPLETION DATE: Mar. 1976 TOTAL FUNDS: $ 120000 Contract DOT-OS-40103

ACKNOWLEDGMENT: FRA

03 080330
TURBO TRAIN REVIEW
A study of the development, systems design and implementation of the United Aircraft Turbo Train is being undertaken to quide the implementation of future advanced technology systems.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 4.35.74
INVESTIGATOR: Buchan, PB
SPONSORING AGENCY: Canadian National Railways, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1974
COMPLETION DATE: Apr. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

03 081786
RAILROAD COUPLER SAFETY RESEARCH AND TEST PROJECT
Because of the recognition of a general lack of knowledge regarding the environment to which couplers and yokes are subjected because of the increased power from modern locomotives, higher operating speeds and increased use of high capacity cars, this project has as its objectives: (1) Study the operating and service conditions of couplers and yokes; (2) Investigate the technical, economic and safety aspects of coupler failures in service; (3) Evaluate standard coupler and yoke designs; (4) Prepare detailed guidelines for the proposed performance and test specifications for couplers and yokes; (5) Conduct a preliminary evaluation of current standard designs of coupler components under conditions listed in Item 4. Data has been acquired from instruments installed in a special test box car which has operated in various services. The analysis of electronic data is being performed by computers.

PERFORMING AGENCY: Association of American Railroads Research Center, Railway Progress Institute
SPONSORING AGENCY: Association of American Railroads Research Center, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Morella, NA (Tel. 216-229-3400)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1972
COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

03 081787
RAILROAD TRUCK SAFETY RESEARCH AND TEST PROJECT
This project has the objective of developing guidelines for new specifications for stronger, safer truck bolsters and side frames to meet the increasingly strenuous demands of rail freight transportation. The principal activity has been a continuation of tests employing a highly sophisticated electronic system to measure the different types of stress to which truck components are subjected under all types of operating conditions. Plans call for completion of stress data gathering and analysis, as well as metallurgical studies on damaged components to determine what caused them to weaken or break.

PERFORMING AGENCY: Association of American Railroads Research Center, Railway Progress Institute
SPONSORING AGENCY: Association of American Railroads Research Center, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Evans, RA (Tel. 312-225-9600)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1973 TOTAL FUNDS: $ 100000

ACKNOWLEDGMENT: AAR

03 081798
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 3—TRUCKS AND SUSPENSION
Overall task objectives are the development of recommended performance specifications and test specifications for conventional three piece trucks. Specifications will be developed through a comprehensive research project built upon the RPI-AAR Railroad Truck Safety Research and Test Project and utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. Test specification development will involve determination of service loading and development of techniques necessary for predicting failure under dynamic loads. Task will also involve developing capability to fatigue test truck components. Field testing will be required for validation of mathematical models. Testing will be carried out under a variety of conditions to obtain load environmental data using a variety of cars with varying loads.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Martin, GC (Tel. 312-225-9600 Ext 877), Korpics, F (Tel. 312-225-9600 Ext 877)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

03 081800
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 4—CAR STRUCTURES
Task objective is the development of recommended performance specifications and design guidelines for railroad freight car structures. Method will involve development of suitable fatigue analysis approach coupled with evaluation of advanced structural analysis methods. Task will include establishing test program goals for environmental loading tests to be pursued during the program. Test plans will be developed and tests conducted to validate fatigue analysis methods for car structural components.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Hawthorne, KL (Tel. 312-225-9600 Ext 862)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

03 081801
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 5—COUPLERS, DRAFTGEAR, AND CUSHION UNITS
Task objectives are development of recommended performance and/or test specifications and design guidelines for railroad freight car couplers, draftgear, and cushion units. Task will build on current RPI-AAR Railroad Coupler Safety Research and Test Project and will utilize dynamic simulation computer models developed during Phase I of the Track Train Dynamics Program. Coupler effort will concentrate on stress and fatigue analysis. Draft gear and cushion unit efforts will be directed toward investigations of opportunities for improved train handling through optimized operating characteristics.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Hawthorne, KL (Tel. 312-225-9600 Ext 866), Brown, TR (Tel. 312-225-9600 Ext 866)
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975 COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

04 007457
HEAVY DUTY MARINE GAS TURBINE DEVELOPMENT PROJECT
The project will undertake those development efforts and improvements necessary to "marinize" the industrial regenerative gas turbine to provide an economically and technically attractive propulsion machinery system for ships of the U.S. merchant marine; having lower acquisition and operating costs than existing forms of propulsion power generation.

The marinization of the industrial regenerative gas turbine will require research and development efforts to provide: (1) a demonstrated capability to efficiently and reliably burn Bunker "C" fuel, and (2) a self-contained (internal) capability to reverse direction of rotation.

As an economically competitive system all efforts will be concentrated on insuring that the developed system will offer: (1) increased ship reliability and availability (reduced maintenance), (2) improved operational manpower utilization, (3) improved energy utilization (reduced specific fuel consumption), and (4) increased shipyard productivity (reduced installation manhours).

REFERENCES:

HEAVY DUTY MARING GAS TURBINE DEVELOPMENT PROJECT Critelli, FX; Kaplan, SM; Carvana, A, General Electric Company, Feb. 1974, MRIS #053938

PERFORMING AGENCY: General Electric Company Gas Turbine Department/
INVESTIGATOR: Kaplan, SM (Tel. 518-3742211)
SPONSORING AGENCY: Maritime Administration /Department of Commerce DDM-467,
RESPONSIBLE INDIVIDUAL: Critelli, FX (Tel. 207-9675425)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1970 COMPLETION DATE: June 1975 TOTAL FUNDS: $ 8025000. Contract 0-35510 (CS)

ACKNOWLEDGMENT: Maritime Administration

04 054561
ON BOARD ENERGY STORAGE FOR TRANSIT CAR POWER CONSUMPTION REDUCTION
Description: The design, development and testing of an electric propulsion system with an onboard energy storage unit for use on various subway and commuter cars. The kinetic energy of the moving car during braking is directed to a motor driven flywheel resulting in storage of the energy by increasing the speed of the flywheel. During acceleration the flywheel energy is released and supplies the majority of power required for acceleration of the car. Third rail power supplies an average power flow which is low through a chopper for drag, mechanical and electrical losses. Performance by computer analysis indicates a potential energy savings of 30% and peak power reduction as high as 60% over a typical NYCTA track profile. Verification of performance compared to conventional cars will be accomplished by operation on the NYCTA subway lines.

PERFORMING AGENCY: Metropolitan Transportation Authority of New York
INVESTIGATOR: Nickel, E
SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1974 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (AR 182)

04 054697
MONITORING AND DIAGNOSTIC EQUIPMENT FOR MAINTENANCE OF DIESEL ELECTRICAL LOCOMOTIVES
This project is aimed at various aspects of preventive and predictive maintenance of diesel-electric locomotives. The main concern is the effectiveness of modern testing equipment for performance monitoring and maintenance, which includes certain electronic analyzers for the testing of mechanical components, SEARCH (System Evaluation and Reliability Checker) for the testing of electrical components, and onboard data-logger systems for continuous performance evaluation of locomotives.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 3.11.72
INVESTIGATOR: Rawat, SK
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

04 058269
DESIGN IMPROVEMENTS TO METROLINER PROPULSION AND AUXILIARY EQUIPMENT
Reduce the failure rate, out of service time and maintenance cost of Metroliner cars by design improvements to propulsion and auxiliary equipment. Assist in the testing of improvements to validate effectiveness.

PERFORMING AGENCY: Klauder (Louis T) and Associates
INVESTIGATOR: Watson, R (Tel. 215-563-2570)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Gannett, CM (Tel. 202-426-9665)

STATUS: Active NOTICE DATE: Feb. 1975 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 90800

ACKNOWLEDGMENT: FRA

04 058270
ELECTRICAL PROPULSION
This sub-program is a continuous effort and is concerned with advanced analytical and laboratory studies in electrical propulsion, as well as basic studies for electrification. The work includes power conditioning systems, linear electric motors, power collection, power distribution, and cost analyses.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Raposa, FL (Tel. 617-494-2031)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Guarino, M (Tel. 202-426-9564)

STATUS: Active NOTICE DATE: Feb. 1975 PPA-RR-05

ACKNOWLEDGMENT: FRA

05 058254
STUDY OF ADVANCED FREIGHT CAR BRAKING SYSTEMS
This study of alternative freight car braking systems is to determine the degree to which any existing concepts represent practical improvements in conventional freight operations. This technology assessment is not limited to alternatives which have been considered for high speed passenger trains, but is to include all known alternatives. The specific tasks include: 1) Detailed delineation of the functional performance of the present air brake system, including consideration of available optional equipment; 2) establishment of detailed life-cycle cost information for the existing system; 3) identification of areas in which the present system could be improved; 4) identification of alternative braking techniques/concepts; 5) analysis of those alternatives; and 6) recommendation of a research and development plan.

The contract to a performing organization has not yet been awarded.

SPONSORING AGENCY: Transportation Systems Center /Department of Transportation, Federal Railroad Administration Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Abbott, R (Tel. 617-494-2250)

STATUS: Proposed NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: FRA

05 081802
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE II. TASK 6—BRAKE SYSTEM
Task objective is evaluation of the performance of present braking systems to identify those areas where improvements would result from the establishment of performance specifications and/or design guidelines. Evaluation will include stopping distance, reaction time, recharge time, wheel tread temperatures, rigging efficiency, etc. Evaluation will include parametric sensitivity study utilizing dynamic simulation computer models developed in Phase I of the Track Train Dynamics Program. If desirable, field testing of modified braking systems will be conducted. Task will also include field testing of effects on stopping performance caused by different brake shoes. These tests will be single car "breakaway" tests and will be augmented to full train characteristics using the dynamic simulation computer models.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
INVESTIGATOR: Hawthorne, KL
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Sutliff, DR (Tel. 312-225-9600 X-1463)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975
COMPLETION DATE: Dec. 1977

ACKNOWLEDGMENT: AAR

06 048861
TES SPONSORED STUDY OF SAN FRANCISCO BART AUTOMATIC TRAIN CONTROL TO ASSURE PUBLIC SAFETY
A comprehensive review of standards, regulations, design criteria and specifications, and industry safety practices will be performed. This information will be compiled into a generalized set of functional requirements for ATC systems. These requirements in turn, will serve as the basis for a detailed functional description of the ATC system and subsystems. Specific system designs, such as BART, will be compared to these requirements and to the functional description to uncover areas of nonconformance and potential sources of compromise (degradation) in overall ATC system safety. Particular attention will be given to the definition of the role of the train attendant within a safe ATC system.

PERFORMING AGENCY: Office of Environment, Safety & Consumer Affairs Department of Transportation
SPONSORING AGENCY: Urban Mass Transportation Administration, Office of Environment and Urban Affairs, Department of Transportation, Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Herringer, FC (Tel. 202-426-4040)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Oct. 1973
COMPLETION DATE: July 1974 TOTAL FUNDS: $ 200000 ID DC-06-0092

ACKNOWLEDGMENT: UMTA (DC-06-0092)

06 054694
TRAIN CONTROL SYSTEMS FOR UNSIGNALLED RAILWAY LINES
This is a feasibility study to examine the requirements for the control of trains along unsignalled rail lines with a view to developing a control system that can be incorporated simply and economically into present-day railroad procedures.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport
INVESTIGATOR: MacKay, NA
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

06 054699
SURFACE WAVEGUIDES FOR GUIDED RADAR AND OBSTACLE DETECTION
Open-guiding electromagnetic structures, i.e. surface waveguides, are being studied, both theoretically and experimentally, with the aim of providing a means for the detection of obstacles in guided ground transportation. Initially, emphasis is being placed on the detection of landslides in mountainous areas on present railway systems. This can be called "Guided Radar", as the intention is to enable a train to be warned within the braking distance of the train. Only the electromagnetic field aspects are being studied in this project; the signal-processing is under separate and co-ordinated investigation, formerly by Dr. G.J.M. Aitken also of Queen's University, now also by Dr. J.C. Beal.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport
INVESTIGATOR: Beal, JC
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

06 080327
COMMUNICATIONS TECHNOLOGY SATELLITE COMMUNICATIONS SYSTEM
A study to investigate the feasibility of using a satellite communications link for railroad communication is underway. The Canadian Communication Technology Satellite will be used for this research.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 1.2.72
INVESTIGATOR: Mackay, NA
SPONSORING AGENCY: Canadian National Railways, Canadian Pacific, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1974
COMPLETION DATE: 1977

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

07 045271
PROVIDE PHYSIOLOGICAL TESTING
Provide physiological testing to include the Follwing: 1. Toxicity by inhalation. 2. Toxicity by ingestion. 3. Toxicity by skin absorption. 4. Skin Corrosion (destruction of living tissue on contact).

PERFORMING AGENCY: United States Testing Company, Incorporated
SPONSORING AGENCY: Office of Environment, Safety & Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Pitts, HB (Tel. 202-4264311)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1973
TOTAL FUNDS: $ 13550 Contract DOT-OS-30077

ACKNOWLEDGMENT: Office of Environment, Safety & Urban Affairs/OST (PR DOT-OS-30077)

07 049659
HUMAN FACTORS IN RAILROAD OPERATIONS
This continues a program of research and consultation on human factors in railroad safety in support of FRA regulatory responsibilities involving human performance.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Devoe, DV (Tel. 617-4942368)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Levine, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Aug. 1975
COMPLETION DATE: June 1974 PPA Contr. PPA-RR-X09

ACKNOWLEDGMENT: FRA

07 054559
COMBINED EFFECTS OF NOISE, WORK AND HEAT ON HUMAN HEARING
In this project the temporary noise-induced hearing loss resulting from exposure to broad band noise while under conditions of heat stress is being examined. Under closely controlled laboratory conditons, twelve young, healthy, male subjects with normal hearing were exposed to different noise levels while under various climatic and workload conditions. Susceptibility to temporary threshold shifts is being evaluated using air conduction audiometric examinations administered both before exposure and two and thirty minutes after exposure.

PERFORMING AGENCY: Department of Health, Education and Welfare, Center for Disease Control
INVESTIGATOR: Heins, A
SPONSORING AGENCY: National Inst for Occupational Safety and Health 438-210-05,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AM 473 1)

07 054562
LABORATORY STUDIES OF NOISE-INDUCED HEARING LOSS
Studies will be conducted of temporary and permanent hearing losses in animals and temporary hearing loss in human subjects, in order to determine effects of impact noise, fluctuating noise levels, "quiet" rest periods, shortened exposures at high levels, intermittent noise, lengthened exposures, and noise spectrum. Work with rats will continue, and some primate work will be done. Laboratory facilities for noise exposure, hearing testing, and anatomical work will be expanded and improved.

PERFORMING AGENCY: Department of Health, Education and Welfare, Center for Disease Control
INVESTIGATOR: Dunn, D
SPONSORING AGENCY: National Inst for Occupational Safety and Health 438-210-03,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974 ID

ACKNOWLEDGMENT: Science Information Exchange (AS 510)

07 055638
DEVELOPMENT OF EXPERIMENTAL DESIGNS AND PSYCHOMETRIC TECHNIQUES FOR THE STUDY OF RIDE QUALITY
The objective of this contract is to design the experiments and psychometric scaling tools necessary for the objective measurement of ride quality. The ride quality measurements are intended to support the development and specification of accurate, statistically reliable ride quality criteria for current and proposed ground transportation vehicles. The specification of these quality parameters is intended to provide the transportation designer with information which can be used (in conjunction with guideway surface characteristics, vehicle dynamic characteristics, projected vehicle velocity profiles, and associated costs) to determine the relative cost effectiveness associated with the use of various suspension systems.

PERFORMING AGENCY: ENSCO, Incorporated
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: May 1975 TOTAL FUNDS: $ 59127 Contract DOT-TSC-864 (CPFF)

ACKNOWLEDGMENT: TSC (PR# TI-0147)

07 080132
INVESTIGATION OF PILOT CONTROL CAPABILITY DURING VIBRATION
Vibration and noise effects are insufficiently understood for general design criteria for advanced aircraft. The objective of this research is to provide the aircraft design community with pilot control performance criteria for mechanically stressed environments in terms that are readily understood and immediately useful. The contractor will collect pilot performance data in terms of control system figures of merit under noise, GZ, and random vibration. The ensemble of seat, display, control, operator and controlled element with the command input and mechanical disturbances have mathematically determinable relationships. Take measurements of errors, control activity and operator behavioral properties used to develop models which will have applicability, over operationally likely combinations of variables.

PERFORMING AGENCY: Systems Technology, Incorporated
INVESTIGATOR: Jex, HR Allen, RW
SPONSORING AGENCY: Department of the Air Force 6570 Aerospace Medical Research, Laboratory BB DF316510 F33615-73-C-4003,

STATUS: Active NOTICE DATE: Sept. 1974 START DATE: July 1974
COMPLETION DATE: June 1975 TOTAL FUNDS: $ 8945 Contract

ACKNOWLEDGMENT: Science Information Exchange (GQF316510 2)

07 080335
SIMULATION OF MOTIVE POWER UNIT SOUNDS
The objective of this study is to produce an audio signal that simulates the in cab sound of a diesel locomotive, where the sound pitch and character depends on the control setting of a cab simulator now being developed at CNR's research and development laboratories.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 1.26.73
INVESTIGATOR: Penstone, SR
SPONSORING AGENCY: Canadian National Railways, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: Dec. 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

08 025441
LOCOMOTIVE CRASH ATTENUATION DEVICE
The train-strikes-vehicle type accident accounts for about 75% of the 1,100 or more annual train-involved grade crossing fatalities. The chief victims of these accidents are passenger car occupants (85%), but infrequent train/bus collisions have been notable tragedies. The fatality producing mechanisms of these accidents-impact force, disintegration, penetration, and fire, can be reduced in severity by modifying the forward cushioning device, while other design features can lessen the tendency of the train to drag, penetrate, roll, or otherwise destroy the impacted vehicle. This task undertakes the analysis, development, fabrication and testing of a crash attenuation device for trains. The device must be effective for a major potential of being reasonably economical to manufacture and install. In addition, the device must be practical. Its use must be compatible with efficient railroad practice.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Koplow, MD
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Levine, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 92400 PPA PPA-RR-211 (CR)

ACKNOWLEDGMENT: FRA

08 048500
CONTROLLED GRADE CROSSING IMPACT TESTS TO ESTABLISH BASELINE DATA ON TRAIN/AUTOMOBILE INTERACTIONS
It is the purpose of this procurement to establish the baseline data required for the evaluation of the effectiveness of planned locomotive attenuator devices.

PERFORMING AGENCY: International Snowmobile Industry Association, Dynamic Science Division
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 158553 Contract DOT-TSC-700 (CPFF)

ACKNOWLEDGMENT: TSC

08 049658
RAIL SAFETY/GRADE CROSSINGS PROTECTION
The program will consist of four major tasks: (1) Development of Application Guidelines for Train 'on board' conspicuity and impact attenuation devices. (2) Standardization of protection equipment will be emphasized including three related cost reduction objectives for production cost, maintenance cost and administrative cost. (3) Innovative System development will study new grade crossing protection concepts. (4) System Analysis will establish interadministration, state and railroad requirements for a data system to accommodate new FRA grade crossing inventory and other data.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Coulombre, RE (Tel. 617-494-2449)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Levine, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1973 PPA Contr. PPA-RR-X02

ACKNOWLEDGMENT: FRA

08 055561
INNOVATIVE RAILROAD-HIGHWAY GRADE CROSSING PROTECTION SYSTEM STUDY
The main objective of this effort is to synthesize and examine innovative concepts for an active grade crossing protection system that demonstrates application potential, effectiveness and significant cost reduction.

PERFORMING AGENCY: Cincinnati Electronics Corporation
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Votolato, AC (Tel. 617-494-2190)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Nov. 1974 TOTAL FUNDS: $ 38718 Contract DOT-TSC-841 (CPFF)

ACKNOWLEDGMENT: TSC

08 055562
INNOVATIVE RAILROAD-HIGHWAY GRADE CROSSING PROTECTION SYSTEM STUDY
The intent of this study is to synthesize and analyze new and innovative techniques for the improvement of railroad-highway grade crossing safety.

PERFORMING AGENCY: Tracor Jitco, Incorporated
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Votolato, AC (Tel. 617-494-2190)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Nov. 1974 TOTAL FUNDS: $ 44052 Contract DOT-TSC-842 (CPFF)

ACKNOWLEDGMENT: TSC

08 055566
STUDY STANDARDIZATION OF GRADE CROSSING PROTECTIVE SYSTEMS AND DEVICES
The purpose of this procurement is to study the economic and technical feasibility of modularization and standardization used to improve the effectiveness and reduce the costs of active grade crossing protection, and to develop the information and technology foundation from which guidelines can be generated governing all appropriate aspects of implementation of active grade crossing protection. The primary immediate goal is enhancement of the effectiveness and reduction of the costs of all aspects of active protection—hardware, installation, maintenance, engineering design, and administration.

PERFORMING AGENCY: Harmon Electronics, Division of Harmon Industries, Incorporated
SPONSORING AGENCY: Transportation Systems Center Department of Transportation
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel. 617-494-2144)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 54201 Contract DOT-TSC-869 (CPFF)

ACKNOWLEDGMENT: TSC

08 055567
STUDY STANDARDIZATION OF GRADE CROSSING PROTECTIVE SYSTEMS AND DEVICES
The purpose of this procurement is to study the economic and technical feasibility of modularization and standardization used to improve the effectiveness and reduce the costs of active grade crossing protection, and to develop the information and technology foundation from which guidelines can be generated governing all appropriate aspects of implementation of active grade crossing protection. The primary immediate goal is enhancement of the effectiveness and reduction of the costs of all aspects of active protection—hardware, installation, maintenance, engineering design, and administration.

PERFORMING AGENCY: Storch Engineers
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Votolato, AC (Tel. 617-494-2190)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 48144 Contract DOT-TSC-870 (CPFF)

ACKNOWLEDGMENT: TSC

08 080333
HUMAN FACTORS IN COLLISIONS AT RAILWAY CROSSINGS
This study develops a behavioral analysis of automobile drivers at level crossings involving road and rail traffic, and will provide recommendations designed to reduce the incidence of level crossing accidents.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 7.5.74
INVESTIGATOR: Wilde, GJS
SPONSORING AGENCY: Canadian National Railways, Canadian Pacific, Canadian Transport Commission, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1974 COMPLETION DATE: Apr. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

08 107636
RAILWAY ADVANCE WARNING SIGN
This project will produce and submit to the T&R committee a new diamond shape black and yellow sign indicating the road with the tracks at an angle, with a tab showing the number of tracks when their number is 2 and over, or any other alternatives. The study should cover 7 models: 90 degree angle and 60, 45 and 30 degree angles in rights and lefts. Full scale reflectorized signs, to be viewed by day or by night, should be submitted. The symbols to be used are somewhat similar to the ones shown on W-24R.

PERFORMING AGENCY: Roads and Transportation Association of Canada
INVESTIGATOR: Bourque, RJ
SPONSORING AGENCY: Roads and Transportation Association of Canada

STATUS: Active NOTICE DATE: Feb. 1974 START DATE: 1968

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

09 054560
DEVELOPMENT OF NEW CORROSION PROTECTION DEVICES FOR SUBWAY EQUIPMENT
Description: To research & develop new or improved corrosion protection devices for subway equipment installed in severely corrosive environments. Project will result in improved reliability and safety to public and operating personnel and will reduce maintenance costs.

PERFORMING AGENCY: Long Island Lighting Company
SPONSORING AGENCY: Long Island Lighting Company

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AP 698)

09 058267
METALLURGICAL TESTS AND ANALYSIS FOR HAZARDOUS MATERIAL RAILROAD TANK CARS
The objectives of this task are to (a) collect a data base on railroad tank car and pressure vessel steels, (b) prepare guidelines for steels to be used in railroad tank car construction, (c) evaluate the elevated temperature performance characteristics of TC-128 steel, and (d) perform a metallurgical evaluation of full scale tanks tested at White Sands Missile Range.

PERFORMING AGENCY: National Bureau of Standards, Institute for Materials
INVESTIGATOR: Interrante, C (Tel. 301-921-2997)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Dancer, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1973
COMPLETION DATE: June 1975 AR-40008

ACKNOWLEDGMENT: FRA

09 080133
NAVY VEHICLE DESIGN AND CONSTRUCTION: COMPUTER AIDS FOR STRUCTURAL ANALYSIS AND DESIGN
The bulk of research in structures and structural mechanics is devoted to the mathematical modeling of complex physical systems and the development of mathematical procedures for manipulating such models. Research here is concerned with the computer-aided design environment, principally the representation and communication aspects of the design process, in order to make advances in structural analysis and optimization with advances in computer science. This study continues to explore new concepts and techniques to enhance the computer-aided analysis and design of structural systems, concentrating on those aspects which make the design environment more flexible, general, and economical. Specific projects to be studied deal with the representation of design information within a management information system, the decomposition of structural mechanics application programs into its constituent modules, and the development of a taxonomy to classify structural mechanics programs, with the eventual aim of combining existing modules into new program capabilities.

PERFORMING AGENCY: Carnegie-Mellon University Department of Civil Engineering
INVESTIGATOR: Fenves, SJ
SPONSORING AGENCY: Office of Naval Research /Department of the Navy DN223456 N00014-67-A-0314-001,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974
COMPLETION DATE: June 1975 TOTAL FUNDS: $ 20000 Contract

ACKNOWLEDGMENT: Science Information Exchange (GQN223456 2)

09 104774
PROPERTIES AND PERFORMANCE OF CLEAR AND PIGMENTED COATINGS ON WOOD
An attempt is made to find which types of coatings have the best durability so that advice can be given to users and to determine which basic properties confer durability to assist in development of coatings with improved performance. Both natural and accelerated weathering are used in evaluation studies. Exterior exposures of clear finishes have been completed and a report repared. Factory-coated sidings are being exposed in comparison with plastic materials. The results of the wood stabilization project are being assessed. Reports Issued: The Swelling of Wood in Polar Organic Solvants, H.E. Ashton, Wood Science, Vol. 6, No. 2, pp 159, 1973. Exterior Exposure Study of Stains and Clear Finishes, H.E. Ashton, Canadian Paint and Finishing, Vol. 48, 2, pp 12 (February 1974). Removal of Solvent From Swollen Wood, H.E. Ashton, Wood Science, Vol. 6, 4, pp 368 (April 1974).

PERFORMING AGENCY: National Research Council of Canada Division of Building Research
INVESTIGATOR: Ashton, HE
SPONSORING AGENCY: National Research Council of Canada

STATUS: Active NOTICE DATE: Jan. 1975 START DATE: 1954

ACKNOWLEDGMENT: National Research Council of Canada, Div Bldg Res

09 115951
CHEMICAL BASIS OF RESISTANCE OF WOODS TO MARINE BORER ATTACK
Naval wooden structures must be protected from marine borers. Improved borer control would afford substantial savings. A few tropical wood species are borer-resistant by reason of chemical properties; the objective is to determine the nature of the protectants in resistant species for synthesis and use as improved preservatives. The wood tissues are subjected to chemical separation techniques. Tissue extracts, chemical constituents of active extracts, and structurally related compounds are assayed for anti-borer and anti-fungal activity. The mode of action of active compounds on borer physiology is being sought.

PERFORMING AGENCY: Department of the Navy, Department of Defense
INVESTIGATOR: Bultman, JD
SPONSORING AGENCY: Department of the Navy, Department of Defense DN320195,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (ZQN320195 1)

09 115952
INTERNATIONAL BIODETERIORATION PROGRAM
The use of present-day wood preserving treatments results in the introduction of some very toxic material into the marine environment. This project, the U.S. portion of an International Research Program, is to develop new, non-polluting natural and synthetic wood treatments that can be made available if the use of heavy metals and cresoste are prohibited to the Navy. 1. Test sites will be established in a variety of Marine environments, world-wide, and catalogue the endemic species of wood borers and wood-rot fungi, and determine where wood protection practices are required, and which will be most effective and economical. 2. Conduct screening tests of promising new wood treatments, and screen commercially available, naturally resistant woods contributed by member countries in this international program. 3. Attempts will be made to isolate the active constituents of resistant woods, and impregnate them into non-resistant, inexpensive timbers; thereby combining maximum durability and economy.

PERFORMING AGENCY: Department of the Navy, Department of Defense
INVESTIGATOR: Depalma, JR
SPONSORING AGENCY: Department of the Navy, Department of Defense DN145005,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (ZQN145005 3)

10 045934
TRANSPORTATION NOISE ABATEMENT
U.S. Army Research Office, Durham, N.C. will provide engineering data on the performance of noise abatement techniques for rapid transit systems as outlined in the document entitled 'Work Statement—Transportation Noise Abatement'.

PERFORMING AGENCY: Army Research Office, Department of Defense
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Ostrosky, D (Tel. 617-494-2758)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 6500 IA DOT-RA-74-17

ACKNOWLEDGMENT: TSC

10 045983
RAPID TRANSIT NOISE ABATEMENT AND COST REQUIREMENTS
The purpose of this effort is to provide an engineering assessment and evaluation of the acoustic noise environment associated with the New York City Rail Transit System, and the determination of combinations of noise abatement techniques for reducing the existing noises enviroment to specific levels at minimum cost.

PERFORMING AGENCY: Polytechnic Institute of New York
SPONSORING AGENCY: Urban Mass Transportation Administration

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Nov. 1973 COMPLETION DATE: Dec. 1974 TOTAL FUNDS: $ 70000 Grant NY-11-0010

ACKNOWLEDGMENT: UMTA (NY-11-0010)

10 048581
MAGNITUDE OF RAIL RAPID TRANSIT GENERATED NOISE ON THE CHICAGO TRANSIT AUTHORITY SYSTEM
The university will make an assessment and evaluation of the magnitude of rail rapid transit generated noise on the Chicago Transit Authority system. It will also study ways and means of abating such noise and the most cost effective techniques to use. This is one part of an overall UMTA program encompassing all cities with rail rapid transit. The Transportation Systems Center is providing technical direction on the program for UMTA. The effort will cover a 13 month period. Both track and station areas will be studied.

PERFORMING AGENCY: Illinois University, Chicago
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Hughes, PG (Tel. 202-426-0080)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1974 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 61092 Grant IL-11-0007

ACKNOWLEDGMENT: UMTA (IL-11-0007)

10 048772
RAILROAD TERMINAL OPERATIONS
The objective of this procurement is the acquisition of a data base for assessing the air pollution in the St. Louis area attributable to railroad terminal operations.

PERFORMING AGENCY: Parsons, Brinckerhoff, Quade and Douglas, Inc
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1974 COMPLETION DATE: July 1974 TOTAL FUNDS: $ 10000 Contract DOT-TSC-801 (FFP)

ACKNOWLEDGMENT: TSC

10 071565
METHODS FOR ANALYSIS OF HYDROCARBONS IN MOBILE SOURCE EMISSIONS
Low levels of hydrocarbons expected in 1975-76 automobile exhaust present a problem for instruments and methods developed for higher present day levels. A comprehensive review and definition of hydrocarbon analysis and sample collection procedures is underway with a view toward defining interferences, linearity, and repeatability at the mandated exhaust concentrations.

PERFORMING AGENCY: Environmental Protection Agency, National Environmental Research Center
INVESTIGATOR: Sigsby, JE
SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development 26 ACV 05 72P18333,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973 COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AO 18333 1)

10 071566
STUDY OF STRATEGY ALTERNATIVES FOR OXIDANT CONTROL IN THE LOS ANGELES AIR QUALITY REGION
Objectives: Assist EPA in screening strategy alternatives for oxidant controls in the Los Angeles Air Quality Region to facilitate selection of one of several strategies which are superior on the basis of cost and effectiveness. (2) Approach: A base line for emissions for both fixed and mobile sources will be defined for reference years 1975 and 1977. All currently implemented and mandated controlled devices will be included in computing the base line. The costs and effectiveness of various techniques for reducing the emission levels will be analyzed and compared. Techniques to be investigated will include additional stationary source control, additional mobile source emission control devices, public transportation alternatives to the private auto, and policy measures to reduce demand for private auto travel. Various optimum mixes of these tactics into promising strategies will be determined. These will include mixes optimized on cost and on various levels of effectiveness. Sensitivity of the evaluations of the strategies to differences in input data will be determined in an attempt to quantify the level of uncertainty of the evaluation. (3) Current Plan and/or Progress: The project has been staffed, and the data base is being assembled. Word has been initiated on modifications of existing analytical models for application to this project.

PERFORMING AGENCY: Rand Corporation
INVESTIGATOR: Goeller, B
SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development 68-01-0475 72P20637,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973 COMPLETION DATE: June 1974 Contract

ACKNOWLEDGMENT: Science Information Exchange (AO 20637 1)

11 025323
TRANSIT SYSTEM OPERATIONS INTEGRATION PROGRAM DESIGN
Transit System Operations Integration Program Design objectives are preparation of a program plan leading to an inter-modal tie-in of existing systems within urban areas and to identify specific cities for potential demonstration. Morgantown Type System Simulation/Analysis objective is to analyze alternative configurations for the Morgantown project. Continued Water-Bus Demonstration Design task is to evaluate suitability of over-the-water vehicle introduction in 80 cities.

PERFORMING AGENCY: Naval Underwater Systems Center, Department of the Navy
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Yu, J (Tel. 202-426-4022)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 296000 IA DOT-AT-20019

ACKNOWLEDGMENT: UMTA (RI-06-0005(01))

11 038789
TRACKED AIR CUSHION RESEARCH VEHICLE, PHASE V, TEST OPERATIONS PROGRAM
The TACRV Phase V Test Operations Program will be implemented and conducted in conformance with Grumman Report PMT-B4-R72-6 TACRV Phase V Test Operations Plan. Effort will be required at DOT's High Speed Ground Test Center and Grumman, Bethpage to satisfy the various activities associtated with TACRV test operations. The TACRV Test Operations Program consists of the following tasks: Test Operations-HSGTC, Test Operations-Bethpage, Ingress/Egress System Design, Fabriction and Installation, Guideway Perturbations Design, Fabrication and Installation, TACRV Remote Control Design, TACRV Systems Interface Management and TACRV Arrestment System Study.

PERFORMING AGENCY: Grumman Aerospace Corporation
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Lampros, AF (Tel. 202-4269564)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1973 COMPLETION DATE: Jan. 1976 TOTAL FUNDS: $ 2606823 DOT-FR-30041 CT-41

ACKNOWLEDGMENT: FRA

11 045911
INVESTIGATION OF GROUND TRANSPORTATION VEHICLES SUPPORTED BY AERODYNAMIC FORCES
The objective of this contract is to obtain information on the dynamic stability of high speed ground transportation vehicles supported entirely by aerodynamics forces.

PERFORMING AGENCY: Princeton University Trustees, Office of Research & Project Administration
SPONSORING AGENCY: Transportation Systems Center Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1973 COMPLETION DATE: Sept. 1974 TOTAL FUNDS: $ 93282 Contract DOT-TSC-682 (CR)

ACKNOWLEDGMENT: TSC

11 048879
ANALYSIS OF UT NEEDS WITH PARTICULAR EMPHASIS ON PRT SYSTEMS
The primary objective of this effort is to develop and describe the most appropriate role for PRT systems within the overall U.S. transportation system with particular consideration given to the 1985 and 2000 time periods.

PERFORMING AGENCY: Johns Hopkins University
SPONSORING AGENCY: Urban Mass Transportation Administration MD-11-0001-00,
RESPONSIBLE INDIVIDUAL: Herringer, FC (Tel. 202-426-4040)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1974 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 82710 Grant DOT-MD-11-0001-00

ACKNOWLEDGMENT: UMTA (MD-11-0001-00)

11 048918
TRACKED MAGNETICALLY LEVITATED VEHICLE TECHNOLOGY PROGRAM
A conceptual design shall be made of the total suspension and associated guideway for and 80-passenger vehicle which will satisfy the vertical and lateral ride quality specifications of Appendix A at all speeds below 300 mph. The primary suspension shall consist of superconducting coils acting on conductors.

PERFORMING AGENCY: Ford Motor Company, Transportation Res & Planning Off
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Wilson, WW (Tel. 202-426-0872)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974 COMPLETION DATE: July 1975 TOTAL FUNDS: $ 2133866 Contract DOT-FR-40024 (CPFF)

ACKNOWLEDGMENT: FRA

11 048919
EXPERIMENTS IN GUIDEWAY LEVITATION VEHICLE INTERACTION DYNAMICS
The Contractor shall furnish all necessary qualified personnel, facilities, materials, and such other services required to construct and test experimental models of various guideways and vehicles. Primary attention will be on beam type guideways of multiple spans and the Tracked Levitated Research Vehicle (TLRV) and the Prototype Tracked Air Cushion Vehicle (PTACV). Results of the test will be analyzed using the latest computer techniques and will be compared where available to theoretical computations.

PERFORMING AGENCY: Duke University School of Engineering
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Sperty, JP

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Nov. 1975 TOTAL FUNDS: $ 35000 Contract DOT-FR-4-4098

ACKNOWLEDGMENT: FRA

11 054701
MAGNETIC LEVITATION AND LINEAR MOTOR FOR GUIDED GROUND TRANSPORTATION
An investigation into the use of superconducting magnets for the levitation and synchronous propulsion of high speed vehicles. Primary consideration has been given to engineering studies of the magnet and propulsion systems, including lift and drag calculations, levitation magnet and cryogenic system design, magnetic shielding, linear synchronous motor analysis, and the design of a large scale test facility. Numerical calculations of the lift and drag characteristics of our vehicle design have been made, and the effects of rounded magnet corners and finite conductor size have been determined. Levitation magnets have been designed, and it is shown that superinsulation with intermediate heat shields can efficiently minimize the cryogenic heat losses. Fringing fields in the passenger compartment have been calculated and shielding methods are discussed. A literature survey indicates that biological effects of low magnetic fields are not likely to be significant, although insufficient information precludes definite conclusions. Analysis of various aspects of linear synchronous motor propulsion indicates that it can be economically feasible, and that high efficiencies can be obtained for suspension heights up to 30 cm with sequentially powered track sections. Finally a conceptual design for the test facility which will be constructed at Queen's next year is presented.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 6.1.72
INVESTIGATOR: Atherton, DL
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

11 055786
A STUDY OF PRT VEHICLE CRASHWORTHINESS
The purpose of this contract is to obtain the engineering data required to delineate the particular crashworthiness requirements for the PRT-3 vehicle.

PERFORMING AGENCY: Northeastern University
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Aug. 1974
COMPLETION DATE: June 1975 TOTAL FUNDS: $ 24836 Contract DOT-TSC-750 (CR)

ACKNOWLEDGMENT: TSC (PR# TMP-0199)

11 058271
NUMERICAL ANALYSIS METHOD FOR LINEAR INDUCTION MOTORS
The principal objective of this project is to develop an accurate mathematical model of the linear induction motor. Model is correlated with available test data and other available mathematical models. The model being developed is the most general and postulates realistic 3-dimensional, finite-iron motors. Another important part of this inter-agency agreement is the application of the model to on-going hardware projects of interest to FRA.

PERFORMING AGENCY: Jet Propulsion Laboratory California Institute of Technology
INVESTIGATOR: Elliott, DG (Tel. 213-354-3486)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Guarino, M (Tel. 202-426-9564)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1972
COMPLETION DATE: June 1976 DOT-AR-30006

ACKNOWLEDGMENT: FRA

11 058272
TESTING OF ADVANCED POWER CONDITIONING UNIT (PCU) AND LINEAR INDUCTION MOTOR (LIM) PRESENTLY INSTALLED IN THE TLRV (TRACKED LEVITATED RESEARCH VEHICLE)
Testing of an advanced PCU and LIM on available guideway and 8.25 kV wayside power at the Transportation Test Center (TTC). The PCU may be used with rotary squirrel-cage motors on conventional railroads, as well as for LIMs on non-conventional transportation systems. The PCU is more powerful than the electric drive of any existing locomotives, and features variable-voltage, variable- frequency, a high power-to-weight ratio, and a high-power- to-volume ratio. The advanced features of the PCU are made possible by the use of a synchronous condenser and water cooling system. The PCU and LIM will undergo shakedown and low-speed tests through June 1976.

PERFORMING AGENCY: AiResearch Manufacturing Company
INVESTIGATOR: Kalman, G (Tel. 213-323-9500)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Guarino, M (Tel. 202-426-9564)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1974
COMPLETION DATE: June 1977 Contract DOT-FR-40016

ACKNOWLEDGMENT: FRA

11 058273
EVALUATION OF ELECTRICAL PROPULSION BY MEANS OF IRON-CORED SYNCHRONOUSLY OPERATING LINEAR MOTORS
This project constitutes the initial research phase of synchronous linear motors for transportation. The motors considered are restricted to those having both the excitation and armature windings on the same structure, i.e., on board the vehicle. The primary objectives are to determine the feasibility of two types (the homopolar inductor and the claw-pole) for propulsion of railroad vehicles, and to establish a basis for further exploratory R&D on a test wheel. The aim is to develop an alternate to the present linear induction motor, with the potential for higher efficiency and power factor, larger clearances with the reaction rail, and useful attraction and guidance forces to inhibit vehicle derailment.

PERFORMING AGENCY: Polytechnic Institute of New York
INVESTIGATOR: Levi, E (Tel. 212-643-4486)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Guarino, M (Tel. 202-426-9564)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1973
COMPLETION DATE: June 1976

ACKNOWLEDGMENT: FRA

11 058274
TEST PROGRAM ON THE LINEAR INDUCTION MOTOR RESEARCH VEHICLE (LIMRV)
The primary objective of this test program is to obtain essential test data on linear induction motors and on truck/rail dynamics, as well as correlation of this data with theory and mathematical models. The LIMRV is considered an important testbed because of its unique instrumentation and speed range. The LIMRV has established a world speed record for steel-wheel on steel-rail vehicles of 411.5 km/h.

PERFORMING AGENCY: AiResearch Manufacturing Company
INVESTIGATOR: D'Sena, G (Tel. 213-323-9500)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Guarino, M (Tel. 202-426-9564)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1973
COMPLETION DATE: June 1976 Contract DOT-FR-40016

ACKNOWLEDGMENT: FRA

11 110862
MAGNETIC LEVITATION STUDY
The study is concerned with non-contact suspension and propulsion for 300 mph interurban transportation. Magnetic levitation is produced by the repulsive interaction between superconducting magnets on a moving vehicle and the eddy currents induced in guideway mounted aluminum conductors. Propulsion is by a linear synchronous motor which also uses vehicle mounted superconducting magnets and energised guideway coils. A 25 ft diameter rotating wheel test facility is being built in Kingston to test full scale leviatation and propulsion magnets. Vehicle characteristics and guideway configurations are being analysed. Theoretical and experimental studies of magnetic lift, drag and guidance forces and the linear synchronous motor are in progress. The Canadian study complements U.S. D.O.T.- sponsored studies and their is also a technical information exchange agreement with Germany. /RATAOC/

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport TDA07
INVESTIGATOR: Atherton, DL Bennett, J Slemon, GR Robertson, SD Dawson, GE Burke, PE John, VI
SPONSORING AGENCY: Transportation Development Agency, National Research Council of Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Oct. 1971
COMPLETION DATE: Oct. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

12 025185
DEVELOP CONCEPTUAL MODEL FOR RISK DETERMINATION IN HAZARDOUS MATERIALS
To demonstrate the contemplated shipment of given commodities by two modes and to demonstrate the practicability of the risk determination model for evaluating a special permit petition. It is to establish if and how the risk analysis concept can be utilized in the development of and overseeing compliance with hazardous materials transportation regulations.

PERFORMING AGENCY: University of Southern California
SPONSORING AGENCY: Office of Environment, Safety & Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Byrd, WK (Tel. 202-4268492)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1972
TOTAL FUNDS: $ 32547 Contract DOT-OS-20114 (CR)

ACKNOWLEDGMENT: Office of Environment, Safety & Urban Affairs/OST (PR DOT-OS-20114)

12 038719
REDUCTION OF CRIME ON TRANSIT PROPERTIES
Chicago has been selected as the site for this project. The Public Works Department has assembled a task force comprised of transit and law enforcement officers in the Chicago area. The objectives are to limit and deter crime on transit vehicles, stations, and loading zones so as to reduce the widespread fear presently evident and thus remove a barrier to the use of public transit. The approach will be to develop and demonstrate, methods of and devices for discerning and reacting rapidly to criminal incidents occurring in transit vehicles, stations, and loading zones. First, the measures to be demonstrated will be selected and implementation will be planned. After approval of the plan, operation of the selected devices will be carried out to observe their effectiveness.

PERFORMING AGENCY: Chicago, City of, Illinois Department of Public Works
SPONSORING AGENCY: Urban Mass Transportation Administration IL-06-0023,
RESPONSIBLE INDIVIDUAL: Boyle, E (Tel. 202-4269157)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 150000 Grant IL-06-0023

ACKNOWLEDGMENT: UMTA (IL-06-0023)

12 045276
DEVELOP A TRANSPORTATION SAFETY PROGRAM COORDINATION INFORMATION CENTER REPORT
The system would include reporting by agencies, with the objective of allowing the Office of Safety Program Coordination to: 1. Summarize number and rates of fatalities, injuries, accidents, as well as hazards, risks and causes of accidents identified with each mode of transportation on a periodic basis. 2. Identify from DOT sources, catastrophies, severe accidents emerging hazards and risks on a quick response basis for coordinative pruposes. 3. Focus on information regarding the progress made by each transportation mode's safety program towared hazard identification, accident cause perception, and action toward reduction of risks.

PERFORMING AGENCY: Planning Technology, Incorporated
SPONSORING AGENCY: Office of Environment, Safety & Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Vargo, TH (Tel. 202-4269745)

STATUS: Active NOTICE DATE: Feb. 1975 Contract DOT-OS-20216

ACKNOWLEDGMENT: Office of Environment, Safety & Urban Affairs/OST (PR# DOT-OS-20216)

12 045930
INSPECTING RAILWAY WHEEL PLATES
The purpose of this study is to develop a technique and furnish a report to the Government for inspecting railway wheel plates with ultrasonic pulses from a contract area on the tread surface. Single or multiple probes shall be used. Pulse parameters shall be such that Lamb (plate) waves propagate in the plate.

PERFORMING AGENCY: Battelle Memorial Institute/Pacific Northwest Labs
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Swerdlow, C (Tel. 202-426-4168)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 70675 Contract DOT-FR-30018 (CPFF)

ACKNOWLEDGMENT: FRA

12 045986
JOB KNOWLEDGE REQUIREMENTS
The contractor shall supply the necessary facilities, services, materials and personnel to perform the work specified as follows: For the jobs of locomotive engineer, train dispatcher, front-end brakeman, rear-end brakeman/flagman and conductor, prepare: Item 1. A statement of this minimum job knowledge requirements for the safe performance of duties. Item 2. A statement of the minimum job skill requirements for the safe performance of duties. Item 3. A statement of the minimum training requirements for the safe performance of duties. Item 4. A proposed written test of the job knowledge required in Item 1. Item 5. Proposed proficiency checks as tests of the jobs skills required in Item 2.

PERFORMING AGENCY: Dunlap and Associates, Incorporated
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Votolato, AC (Tel. 617-494-2190)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1971
COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 49426 Contract DOT-TSC-736 (CPFF)

ACKNOWLEDGMENT: TSC

12 048571
RAIL SAFETY/EQUIPMENT
This project seeks the improvement of railroad safety and efficiency by providing a technological basis for improvement and possible regulation in rail vehicle crashworthiness, inspection of equipment, surveillance of equipment, and other important areas.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Lavery, AL (Tel. 617-4942040)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Sept. 1973
TOTAL FUNDS: $ 1093500 PPA Contr. PPA-RR-X14

ACKNOWLEDGMENT: FRA

12 048655
OBSERVATIONAL PROGRAMS
The U.S. Atomic Energy Commission shall perform or have performed observational programs for surveillance of radioactive materials in transportation.

PERFORMING AGENCY: Atomic Energy Commission
INVESTIGATOR: Barker, LI
SPONSORING AGENCY: Office of Environment and Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Grella, AW (Tel. 202-426-2311)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1974
TOTAL FUNDS: $ 10000 IA DOT-AS-40035

ACKNOWLEDGMENT: Office of Environment, Safety and Consumer Affairs

12 048790
STUDY OF THE PHYSICAL PARAMETERS OF TRANSPORTATION ACCIDENTS
This study will involve a literature data search of the various information which now exists with regard to the physical forces and parameters involved in transportation accidents. The study will analyze this data and

develop accident damage test criteria to represent those accident conditions.

PERFORMING AGENCY: Atomic Energy Commission
SPONSORING AGENCY: Office of Environment, Safety & Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Grella, AW (Tel. 202-4262311)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1972
TOTAL FUNDS: $ 65000

ACKNOWLEDGMENT: Office of Environment, Safety & Urban Affairs/OST (PR DOT-AS-20071)

12 048905
FACTORS AFFECTING RAILROAD CREW VIGILANCE
The Small Business Administrations Subcontractor (hereinafter referred to as the Contractor) shall supply the necessary services and personnel to conduct studies to determine the important factors involved in vigilance loss by railway crew personnel in the operation of their duties. These studies will be performed in a locomotive cab simulator located at the U.S. Army Materials Research Agency in Watertown, Massachusetts.

PERFORMING AGENCY: Small Business Administration
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Votolato, AC (Tel. 617-494-2190)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: Sept. 1974 TOTAL FUNDS: $ 21477 Contract DOT-TSC-817 (CPFF)

ACKNOWLEDGMENT: TSC

12 048924
STUDY OF CURRENT STATUS OF TRANSPORTATION SAFETY RESEARCH AND DEVELOPMENT
The objective of this task is to determine the current status of transportation safety R&D by analyzing, reviewing, critiqueing and/or performing pertinent studies in the field. Three study areas have been identified: analysis and critique of causal factor studies; analysis and critique of cost/benefit studies, and an investigation of the impacts of R&D innovations. The results of these determinations will be used as inputs to subsequent efforts aimed at maximizing the return on the safety R&D investment and to indicate avenues for future safety related R&D efforts.

PERFORMING AGENCY: Science Management Corporation
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: Oct. 1974 TOTAL FUNDS: $ 30260 Contract DOT-TSC-860 (CPFF)

ACKNOWLEDGMENT: TSC

12 048967
OPTIMIZATION OF AUDIBLE WARNING DEVICES
The objective of this contract is to maximize effectiveness and minimize annoyance of motor and railroad carrier emergency audible warning signals. The requirements for both urban and suburban areas will be investigated.

PERFORMING AGENCY: Society of Automotive Engineers
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel. 617-494-2144)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: June 1975 TOTAL FUNDS: $ 99000 Contract DOT-TSC-868

ACKNOWLEDGMENT: TSC

12 048973
STUDY THE DYNAMICS OF TRAIN REAR-END COLLISION ACCIDENTS
It is the purpose of this contract to establish the preliminary baseline data, through the medium of controlled train impacts, required to study the dynamics of train rear end collision accidents.

PERFORMING AGENCY: Ultrasystems, Incorporated, Dynamic Science Division
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel. 617-494-2144)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 423882 Contract DOT-TSC-840 (CPFF)

ACKNOWLEDGMENT: TSC

12 054567
RAILROAD TANK CAR SAFETY VALVE TEST PROGRAM
This program is being accomplished under the area of technology transfer in the AFRPL Rocket Propulsion Plan. This AFRPL conducted program will provide data required by the Federal Railroad Administration of the Department of Transportation in their job of seeking means to improve railroad tank car safety in accidents. The object of this program is to determine the relief and flow characteristics of class DOT-112A tank car safety relief valves. The program consists of four basis phases. The first phase of effort in this program is the analysis phase, and will define the most appropriate way to measure the performance of the relief valves. The second phase is system build-up. The third phase is valve testing and the last phase is preparation of the final report. Under the analysis phase additional ways to accomplish steady state and blowdown tests of saturated and superheated propane will be evaluated. The instrumentation needed to obtain flow data will be investigated and an instrumentation list compiled for each approach. Each test approach will be analyzed for the capability to expand to test larger valves at a future date. Specific equipment and materials needed will be determined for each test approach. The third phase of the program will be to test the relief valves in water. GN2 and propane in accordance with approved procedures resulting from phase I. The first test to be run will be a proof test of the propane tank at one and one-half times the tank maximum working pressure of 500 psi. The nitrogen and water flow tests, to be run next, will check out the flow measurement capabilities of the system and provide flow data for the test values. These tests will also calibrate the epoxy flow nozzles used for flow measurement. Data from the nitrogen and water tests will be correlated with other data generated for these types of valves and will also serve as a baseline for comparison of known fluids with propane. The cracking and reseat pressures of the test valves will also be determined. The propane flow tests will then be conducted. These tests will be conducted with saturated vapor, as well as saturated liquid which will flash through the valves. Flow rates for the valves will be determined for various pressures from cracking pressure of approximately 280 psig to 475 psig. The final item to be accomplished in the program will be to write a final report.

PERFORMING AGENCY: Department of the Air Force, Rocket Propulsion Laboratory
INVESTIGATOR: Silver, R
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations DF342540,
RESPONSIBLE INDIVIDUAL: Dancer, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: Dec. 1975

ACKNOWLEDGMENT: Science Information Exchange (ZQF342540 1)

12 055784
TOXICOLOGICAL AND SKIN CORROSION TESTS ON HAZARDOUS MATERIALS
Toxicological data are inadequate for classifying certain of the materials being transported. The work is to verify further the suitability of proposed transportation health hazards classification criteria and to permit classification of additional materials according to these proposed criteria.

PERFORMING AGENCY: Department of the Air Force, Toxic Hazards Division
SPONSORING AGENCY: Office of Environment, Safety & Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Harton, EE (Tel. 202-4262311)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: Sept. 1975 TOTAL FUNDS: $ 19950 IA AS-40079

ACKNOWLEDGMENT: Office of Environment, Safety & Urban Affairs/OST (PR# DOT-AS-40079)

12 058266
RAILROAD TANK CAR FIRE PROGRAM
The objectives of this task are to (1) perform laboratory scale fire tests to evaluate the effectiveness of coatings in providing fire protection for tank cars and (2) develop analytical models of pool and torch fires.

PERFORMING AGENCY: Ames Research Center /National Aeronautics and Space Administration
INVESTIGATOR: Mansfield, J (Tel. 415-965-5991)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Dancer, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1973 COMPLETION DATE: Dec. 1976 AR-30033

ACKNOWLEDGMENT: FRA

12 058268
HAZARDOUS MATERIAL RAILROAD TANK CAR TORCHING STUDY
The objectives of this task are to (a) construct a facility which would enable the flow structure and properties of a burning jet to be characterized and (b) design and conduct a series of torch tests to evaluate the ability of railroad tank cars to withstand the effects of torching with and without insulation.

PERFORMING AGENCY: Ballistic Research Laboratory
INVESTIGATOR: Townsend, W (Tel. 301-272-3979)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Dancer, D (Tel. 202-426-1227)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1974 COMPLETION DATE: June 1975 Ar-44061

ACKNOWLEDGMENT: FRA

12 071567
CAUSAL FACTORS IN ACCIDENTS
Efforts to analyze industrial accidents for the purpose of defining primary and contributing causes, either psychological or non-psychological in nature, suffer a number of shortcomings. Routine accident investigations and reports acknowledge little more than the agent which was the source of injury and the extent of injury. If personal faults are noted, there is no indication as to what led to these human errors. This project intends, via contract, to develop a plan for more completely probing work accidents and "near misses" for better clarifying the human, machine, and environmental factors which singly or in combination were responsible for the real or near mishap. It further plans to employ this technique on a prospective basis in analyzing the basis for accidents or "near misses" involving certain high risk job operations (e.g., use of powered trucks in materials handling) or certain types of injuries (e.g.g, falls, burns). The project is expected to yield information bearing on (a) improved accident investigation and reporting procedures, (b) proportion of accidents or "near misses" due to primary human vs. machine vs. environmental causes and underlying considerations, and (c) suggestions for improved preventative measures in light of the causes so identified.

PERFORMING AGENCY: Department of Health, Education and Welfare, Center for Disease Control
INVESTIGATOR: Cohen, A Margolis, B Cohen, H
SPONSORING AGENCY: Department of Health, Education and Welfare, Public Health Service, Center for Disease Control 436-230-01, National Inst for Occupational Safety and Health

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973 COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AS 452)

12 080319
RAIL TECHNOLOGY SAFETY COUNCIL
A preliminary conceptual study of the state of the art in rail safety technology is underway. It consists of a literature search coupled to a brief review of the possible areas of application to improve the level of rail safety.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 7.32.74
INVESTIGATOR: MacDonald, JA
SPONSORING AGENCY: Bureau of Management Consulting, Canada, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974 COMPLETION DATE: July 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

12 081788
RAILROAD TANK CAR SAFETY RESEARCH AND TEST PROJECT
This project is directed at improving the performance of tank cars in derailments and minimizing the danger of catastrophic tank car accidents. When initiated, it consisted of 14 Phases. Phase 08, Reduced Scale Model Studies and Phase 13, Head Shield Study are completed. The other phases, on which work is continuing, are the following: Phase 01—Accident Review; Phase 02—Accident Data Analysis; Phase 03—Material Study; Phase 04— Literature Review; Phase 05—Head Study; Phase 06—Safety Valve in Liquid Study; Phase 07—Safety Relief Devices; Phase 09—Design Study, Tanks and Attachments; Phase 10—Design Study, Car; Phase 11—Thermal Effects Studies; Phase 12—Vessel Failure Research; Phase 14—Stub Sill Car Buckling Study.

PERFORMING AGENCY: Association of American Railroads Research Center, Railway Progress Institute
INVESTIGATOR: Phillips, EA (Tel. 312-225-9600 Ext 863)
SPONSORING AGENCY: Association of American Railroads Research Center, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Phillips, EA (Tel. 312-225-9600 Ext 863)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1970 COMPLETION DATE: 1976

ACKNOWLEDGMENT: AAR

13 045012
STUDY OF ALTERNATIVES TO PROPOSED RE-ELECTRIFICATION OF NEW HAVEN REGION OF PENN CENTRAL RAILROAD

The Contractor shall perform engineering services and furnish recommendations and appropriate reports by studying alternatives to the proposed re-electrification of the New Haven Region of the Penn Central Railroad and by studying the feasibility of employing 25kv overhead power supply between New Haven, Conn. and New York, N.Y., including the N.Y. Connecting RR.

PERFORMING AGENCY: Gibbs and Hill, Incorporated
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973 COMPLETION DATE: June 1974 TOTAL FUNDS: $ 28780 Contract DOT-FR-30065 (CPFF)

ACKNOWLEDGMENT: FRA

15 025325
SOCIO-ECONOMIC INDICATORS STUDY
Perform a study of socio-economic indicators affecting public transportation, coordinating with other related research design and develop a transportation system sketch planning technique utilizing recent advances in computing hardware: develop a micro simulation package to examine vehicle and passenger flows at transit stations and other facilities: and perform special studies as required.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Dial, R (Tel. 202-426-4047)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1972 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 843000 Contract DOT-UT-200020

ACKNOWLEDGMENT: UMTA (IT-06-0050)

15 045815
BART IMPACT PROGRAM
Under this task TSC will provide staff personnel and special consultants necessary to perform required management functions for the complex and comprehensive BART Impact Program. Management of the four basic types of tasks as specified by the basic ordering agreement will be provided. A summary of these tasks is as follows: (1) overall management (task # 1) and data management, (2) specific analysis efforts, (3) identifying particular impact areas, and (4) specialized efforts of the overall program objectives.

PERFORMING AGENCY: Metropolitan Transportation Commission
SPONSORING AGENCY: Office of the Secretary of Transportation
RESPONSIBLE INDIVIDUAL: Bouchard, RJ (Tel. 202-4260163)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973 TOTAL FUNDS: $ 135419 Contract DOT-OS-30176/1

ACKNOWLEDGMENT: OST

15 045966
A METHOD FOR ASSESSING PRICING AND STRUCTURAL CHANGES ON TRANSPORT MODE USE
Development of a mechanism which is capable of examining a policy change, for example, a central business district parking surcharge, and of tracing out the effects of such a change, not only on the relative utilization of alternative modes, but also on the spatial distribution of travel from changes in modal usage.

PERFORMING AGENCY: Northwestern University, Evanston
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Weiner, E (Tel. 202-426-4168)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 50000 Contract DOT-OS-40001

ACKNOWLEDGMENT: Office of Policy, Plans and International Affairs

15 045967
RE-USE PLANNING OF TRANSPORTATION PROPERTY ABANDONMENTS
To develop an operational planning paradigm which coordinates considerations of re-use potential with the more immediate aspects of transportation prospective abandonments of rail branch lines, secondary roads, and general aviation airports, in a manner which anticipates long-term trends in excess transportation plant and in the dearness of land resources.

PERFORMING AGENCY: Iowa University, Iowa City
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Nupp, BL (Tel. 202-426-4447)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 69388 Contract DOT-OS-40019

ACKNOWLEDGMENT: Office of Policy, Plans and International Affairs

15 045971
TRANSPORTATION SYSTEMS FOR DECENTRALIZING METROPOLITAN REGIONS
The major objectives of this effort are to: a. Bring about better understanding of decentralizing metropolitan regions and their relation to the changing demands for and the conditions of various modes of transportation therein. b. To identify the actual and potential impacts of new technology upon transportation demand. c. To identify the major public policy questions, particularly for transportation and land-use planning processes, that are implicit in metropolitan regional transportation systems. d. To begin dialogue between university, local, state, regional and Federal professionals involved in urban problems.

PERFORMING AGENCY: Syracuse University
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: McCready, R (Tel. 202-426-0163)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 9290 Contract DOT-OS-30118

ACKNOWLEDGMENT: Office of Policy, Plans and International Affairs

15 045992
USE OF SPACE BY ECONOMIC ACTIVITIES IN METROPOLITAN AREAS
The objective of this procurement is to obtain research into the processes which determine the use of space by economic activities in metropolitan areas. The analysis should be performed by detailed industry classification and should be tailored to provide for: a) improved land use modeling, and b) improved estimates of traffic flow.

PERFORMING AGENCY: Regional Science Research Center
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Dec. 1973 COMPLETION DATE: Dec. 1974 TOTAL FUNDS: $ 47726 Contract DOT-TSC-733

ACKNOWLEDGMENT: TSC

16 045620
THE DETERMINATION OF PER PASSENGER-MILE ENGERGY CONSUMPTION AND COSTS FOR SUBURBAN COMMUTER SERVICE DIESEL TRAINS
As energy consumption becomes of greater concern, there develops a greater urgency to get people out of the automobile and into alternate means of transportation. Mass transportation is a primary alternative. In order to prove out this alternative, measurements must be made on existing mass transportation to provide a comparison. The purpose of this study is to measure the energy consumption of diesel commuter trains currently in operation in Chicago, Illinois.

PERFORMING AGENCY: Illinois University, Chicago
SPONSORING AGENCY: Urban Mass Transportation Administration
RESPONSIBLE INDIVIDUAL: Morison, CT (Tel. 202-426-0080)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 7000 Grant IL-11-0006

ACKNOWLEDGMENT: UMTA (IL-06-0006)

16 054703
RAILWAY TO THE ARCTIC
A study of the technical, economic and operational feasibility of a railroad to bring arctic slope oil (and gas) to market. It was concluded that the railway was technically and operationally feasible and financially attractive. Three Routes were studied in detail. The most attractive crossed the arctic slope from Prudhoe Bay to the Mackenzie Delta and then ascended the Mackenzie to near the NWT border with Alberta. Some 360 locomotive units and 11,000 tank cars would be required to move 2,000,000 barrels of oil per day. Capital cost would be about 2.4 billion dollars, annual operating cost 193 million dollars. A tariff of about 67 cents per barrel would provide an adequate return. The railroad would employ some 4600 people. Numerous reports have been prepared. Two phases complete. Third phase is a joint CN/CP study funded by Canadian Government.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport
INVESTIGATOR: Law, CE
SPONSORING AGENCY: Transportation Development Agency

STATUS: Active NOTICE DATE: Oct. 1973

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

16 058256
MEASUREMENT OF RAIL TRANSPORTATION FUEL CONSUMPTION
This project has the objective of establishing accurate information concerning fuel consumption of railroad freight trains in a variety of operations. Primary emphasis will be on TOFC/COFC trains. Accurate basic data will be collected in cooperation with a number of railroads, for revenue-service trains, and analyzed to provide results of general applicability.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Hopkins, J (Tel. 617-494-2048)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel. 202-426-0855)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975 PPA RR-516

ACKNOWLEDGMENT: FRA

16 115949
ALTERNATE FUELS FOR THE REDUCTION OF AIR POLLUTION FROM MOBILE SOURCES
The major objective of this research is to investigate alternate fuels that current internal combustion engines could operate on with little or no modification, and that would be less harmful to the environment than the fuels now used. This investigation will consider all fuels whose use could provide a solution to the problem of air pollution from mobile sources, and would include, but not be limited to, natural gas (methane), propane, butane, ammonia, hydrazine, hydrogen peroxide, hydrogen and reformed gasoline. The end result of this research will be the selection of the two most promising alternate fuels whose use will lead to the reduction and possibly elimination of air pollution from mobile sources. These fuels will represent the immediate and long-range solutions to the pollution problem. Factors considered in the selection of the fuels include: 1) Its availability. 2) Its chemical and thermodynamic properties. 3) Implementation problems. 4) Safety considerations. 5) Environmental impact. 6) Economics. Finally, the fuels will be tested to determine their theoretical and actual performance when applied to current or slightly modified engines. The final report of this research will reflect all data collected and present the candidate alternate fuel whose immediate implementation will greatly reduce air pollution, and the fuel (not hydrocarbon based) that will be the fuel of the future.

PERFORMING AGENCY: Southern University A&M College, Baton Rouge School of Engineering, Mechanical Engineers
INVESTIGATOR: Watson, MM
SPONSORING AGENCY: Environmental Protection Agency, Office of Research and Development 802667 72P21528,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AO 21528)

17 045821
COMPUTER-BASED RAILROAD NETWORK MODEL
The objective of this project is the development of a computer based railroad network model which will be capable of facilitating the analyses of, and providing insights into the potential impacts of alternative public policies aimed at plant and/or corporate rationalization of the railroad industry. Outputs of primary interest will include rates of plant utilization, revenue generation, estimated costs and probable viability, all analyzed on a segment-by-segment basis.

PERFORMING AGENCY: International Business Machines Corporation
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Bouve, T (Tel. 202-426-2920)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Oct. 1973 COMPLETION DATE: Sept. 1975 TOTAL FUNDS: $ 1400000 Contract DOT-FR-40012

ACKNOWLEDGMENT: FRA

17 055601
AGGREGATION METHODOLOGY FOR TRANSPORTATION NETWORK MODELS STUDY
The Contractor shall provide the necessary personnel, services, facilities, material and equipment to accomplish the work set forth in the following item: Conduct an inventory of all important applications of network modelling in transportation systems analysis. The output of this task will be a list of applications, including a brief description of each, together with a classification and description of the principal models employed.

PERFORMING AGENCY: Mathematica, Incorporated
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Kelleher, DJ (Tel. 617-4942144)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: July 1975 TOTAL FUNDS: $ 64797 Contract TSC-883 (FFP)

ACKNOWLEDGMENT: TSC (PR# SA-0062)

17 058255
STUDY OF DEGRADATION OF ACI LABELS BY DIRT
Spectrographic analysis of ACI labels, both clean and degraded by accumulation of dirt, etc., will be carried out with the aim of providing insight into preferred means of reducing the effect of this failure mode on ACI system performance.

PERFORMING AGENCY: Transportation Systems Center
INVESTIGATOR: Ingrao, H (Tel. 617-494-2373)
SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel. 202-426-0855)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975 COMPLETION DATE: June 1975 PPA RR-516

ACKNOWLEDGMENT: FRA

17 058277
INTERMODAL INFORMATION SYSTEM
Two management systems will be developed as part of The Intermodal Network Implementation Program. The operations system, known as the Terminal Control System (TCS), will provide for the day-to-day management of the intermodal terminals, including manpower assignment and distribution of flatcars and trailers. It will do so by computerizing many of the terminal functions, thereby providing timely operating reports as well as inquiry capability. The Management Information System (MIS) will aid in the planning and monitoring functions, matching costs with revenues to measure profitability across various business segments, such as trains, traffic lanes, sales territories, types of equipment, etc. These two systems will provide accurate and timely information to control costs, improve profitability, and assure service. Extensive use will be made of exception reporting to highlight problem areas requiring attention. Also, information will be assembled to facilitate advanced planning such as modeling.

The contract to a performing organization has not yet been awarded.

SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Edson, WD (Tel. 202-426-0771)

STATUS: Proposed NOTICE DATE: Feb. 1975 START DATE: Apr. 1975 COMPLETION DATE: Apr. 1976

ACKNOWLEDGMENT: FRA

17 080332
RAILWAY TERMINAL SIMULATION MODELING
A simulation model is being developed for a railway terminal under the control of Terminal Management Information Service (TMIS). It will be used to investigate methods in which TMIS can be used to improve terminal performance. Data will be used from the Vancouver Terminal of CP rail.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 5.30.74
INVESTIGATOR: MacDwen, GH
SPONSORING AGENCY: Canadian Pacific Transportation Development Agency, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Apr. 1977

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

17 081792
INTERNATIONAL GOVERNMENT-INDUSTRY RESEARCH PROGRAM ON TRACK TRAIN DYNAMICS—PHASE I. TASK 5—ESTABLISH MECHANISMS FOR REPORTING SYSTEM PROBLEMS RELATING TO TRACK TRAIN DYNAMICS
The objective of this task is to develop a perpetual system for collection of Track Train Dynamics data, including the selection of data analysis techniques, software and a mechanisms of advising the industry of trends and significant occurrences. AAR and FRA have worked cooperatively toward development of train accident reporting short forms, and FRA issued a handbook entitled 'FRA Guide To Incident Reports." Although reporting forms and instructions will probably undergo some revision, certain data elements are of particular interest to the Program, including route identification, milepost location, first car involved, causing car, number of locomotives, location of loads and empties, and similar data. AAR is now working to develop long forms for train accident reporting to provide more detailed information. FRA is now utilizing a computerized data management system for storage and retrieval of accident data with AAR having terminal access to this information.

This project is also sponsored by the Transportation Development Agency of Canada.

PERFORMING AGENCY: Association of American Railroads Research Center
SPONSORING AGENCY: Association of American Railroads Research Center, Federal Railroad Administration Department of Transportation, Railway Progress Institute
RESPONSIBLE INDIVIDUAL: Lind, EF (Tel. 312-225-9600 Ext 866)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: 1972 COMPLETION DATE: 1975

ACKNOWLEDGMENT: AAR

18 045249
DEVELOP A STANDARD TRANSPORTATION COMMODITY DESCRIPTION AND CODING SYSTEM
Tasks include: 1. Analyze the requirements for freight tariffs, statistical collection systems, Government controls, foreign and domestic requirements. 2. Review the descriptions from an operational standpoint to determine whether each description meets the operational and other needs of the transportation community. 3. Select the paper products category as the initial area to develop description criteria and catalog the descriptions covering the paper products category. 4. Select additional product categories based upon industry, Federal Government, and Customs Cooperation Council recommendations.

PERFORMING AGENCY: Transportation Data Coordinating Committee
SPONSORING AGENCY: Office of Policy, Plans and International Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Vargo, TH (Tel. 202-426-9745)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1971
COMPLETION DATE: Feb. 1974 TOTAL FUNDS: $ 200000 Contract DOT-OS-10205

ACKNOWLEDGMENT: Office of Policy, Plans and International Affairs

18 080324
THE RAILWAY FREIGHT RATE ISSUE
The historical development of the railway freight rates in Canada is traced to provide the basis for explaining the complex roles played by freight rates and their evolution from an economic function to a sociological or political phenomenon. The inhibiting effects on the development of sound transportation and regional development policies are also analysed.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 4.33.74
INVESTIGATOR: Darling, H
SPONSORING AGENCY: Canadian Institute of Guided Ground Transport

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
COMPLETION DATE: Dec. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 045166
STUDY OF SHIPPER DEMAND CONCERNING EMPTY RAILROAD FREIGHT CARS NEEDED FOR MATERIAL AND COMMODITY LOADING
Create a functional design of the elements and processes (system architecture) necessary for a technically advanced system to collect and predict shipper requests (orders for freight cars to load). Such a system must be operationally suitable and economically justifiable for use by individual Class I railroads as part of their system-wide empty freight car distribution activity. These are related to current FRA project reports on Car Management Studies.

PERFORMING AGENCY: Association of American Railroads
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: West, JB (Tel. 202-4261677)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973 COMPLETION DATE: Feb. 1975 TOTAL FUNDS: $ 171699 Contract DOT-FR-30058 (CR)

ACKNOWLEDGMENT: FRA

20 045251
EFFECTS OF FREIGHT RATES AND SERVICES ON THE ST. LAWRENCE SEAWAY
Tasks include an identification of those rates and services by the more significant connecting modes of transportation needed for the Seaway to perform its economic role effectively, and criteria of reasonableness and discrimination for such rates and services.

PERFORMING AGENCY: Snavely, King and Tucker, Incorporated
SPONSORING AGENCY: Office of Policy, Plans and International Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Swerdlow, C

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Mar. 1971 TOTAL FUNDS: $ 30606 Contract DOT-OS-10019 (CPFF)

ACKNOWLEDGMENT: Office of Policy, Plans and International Affairs/OST (PR DOT-OS-10019)

20 045810
A MULTIREGIONAL INPUT-OUTPUT STUDY OF U.S. COMMODITY FREIGHT SHIPMENTS
A multiregional input-output (MRIO) model provides a consistent framework within which reliable estimates of transportation requirements by industry and region, and all the many interactions between changes in the rest of the economy and transportation can be studied in considerable industrial and regional detail.

PERFORMING AGENCY: Massachusetts Institute of Technology
INVESTIGATOR: Polenske, KR
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Harman, J (Tel. 202-426-4214)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1973 COMPLETION DATE: May 1976 TOTAL FUNDS: $ 259999 Contract DOT-OS-30104

ACKNOWLEDGMENT: Office of Systems Development and Technology

20 048012
AN ANALYSIS OF FACTORS AFFECTING THE SUPPLY AND DEMAND FOR LIVESTOCK TRANSPORTATION
Identify the major flows of livestock and the extent of seasonality in these movements. Determine the rates paid by livestock shippers for transportation and the variability in these rates as related to distance, seasonality and area of operation. Determine the extent of private carriage in the transportation of livestock. Compare revenues of for-hire livestock truckers with their estimated costs.

Interview a sample of livestock dealers, feedlots and slaughter plants located in selected States to obtain data pertaining to rates, flow patterns, types of carriage and the names and addresses of truckers used. Interview a sample of livestock truckers to obtain information concerning their operational practices, experiences and their rate-making policies. Conduct a comparative-analysis of the information obtained to determine the relationships between factors affecting the supply and demand for livestock transportation.

PERFORMING AGENCY: Department of Agriculture, Economic Research Service, Marketing Economics Division ME 11-25-54-00
INVESTIGATOR: Hutchinson, TQ (Tel. 202-4478171)
SPONSORING AGENCY: Department of Agriculture, Economic Research Service, Marketing Economics Division
RESPONSIBLE INDIVIDUAL: Manley, WT (Tel. 202-4478831)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1973 COMPLETION DATE: Feb. 1975 In-House

ACKNOWLEDGMENT: Department of Agriculture

20 048777
ANALYSIS OF FLOW DATA FOR THE 1972/1973 KANSAS WHEAT CROP
It is the objective of the DOT grain transportation analysis to understand the characteristics of the transportation system used in moving grain from farm to country elevator to domestic and export markets. The 1972/1973 crop year was one of terrific pressure on the transportation system particularly in the record export movement of wheat to the Gulf Coast which resulted in part from the Russian wheat sale.

PERFORMING AGENCY: Kansas State University Comptrollers Office
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1974 COMPLETION DATE: Oct. 1974 TOTAL FUNDS: $ 19900 Contract DOT-TSC-799

ACKNOWLEDGMENT: TSC

20 051254
EFFECT OF TRANSPORTATION RATES, FACILITIES, AND INSTITUTIONS UPON THE GRAIN MARKETING SYSTEM IN MONTANA
OBJECTIVE: Determine present railroad and truck rate structure for grain moving within and out of Montana; determine changes in railroad grain loadings and rates over past 40 years as compared with production; analyze movememts of grain directly from farms and elevators, both by truck and railroad. Determine handling methods, rates, pricing, origin, destination and uses for grain handled by truck from farm and elevator points in Montana; determine effects of barge services on Columbia upon truck and rail transportation in Montana. Determine effects of trends in transportation methods and rates on grain-pricing methods and institutions in Montana, with special attention to different kinds of wheat and other grains. APPROACH: Will use secondary data and information obtainable from regulatory authorities. Also obtain data from carriers and farmers through use of questionnaires. Transportation models and location theory will be applied to data in analysis. PROGRESS: With respect to research in the transportation area in general, further reading of the literature has been done and working relationship with Gene Carroll, the State Department's transportation specialist, has been developed. Various research topics have been discussed, various current transportation problems have been attacked, and an investigation is underway to determine what the crucial problems are so an extension of the work already done can be accomplished.

PERFORMING AGENCY: Montana State University, Bozeman Department of Agricultural Economics/
INVESTIGATOR: McConnen, RJ St George, G
SPONSORING AGENCY: Department of Agriculture, Montana, Cooperative State Research Service/ 0002036 MONB00050,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (GY 2036 6)

20 051255
EFFECTS OF TRANSPORTATION RATES-SERVICES ON LOCATION, NUMBER AND SIZE OF GRAIN HANDLING FACILITIES
OBJECTIVE: Determine impact of changing transportation rates on grain handling facilities in Montana as a basis for future planning. APPROACH: Determine sources of grain supply, types of transportation to

farm storage and elevators and costs. Obtain similar information on the distribution of Montana grains including flow patterns for domestic and export trade. Use these factors to determine type, size and location of grain handling facilities needed for the future. PROGRESS: To determine the optimal number, size, and location of country grain elevators has been completed. Meetings with the major grain handlers in the State. The next phase of this research is to analyze the export demand for Montana winter and spring wheat in the Asian market. Since the U.S.D.A. or the State of Montana do not collect data on the exports of wheat, a method was developed to estimate the State's exports of spring and winter wheat. This method is a residual method taking into account the exports of wheat from the Pacific Northwest Ports and subtracting out movements from other states and the milling of Montana wheat in other states. This analysis shows that about 50 percent of Montana's production in 1971-72 moved into export channels. Approximately 25 million bushels of spring and 5 million bushels of winter wheat were exported in 1971-72. In 1960-61, only 2 million bushels of spring and 13 million bushels of winter wheat were shipped overseas, mostly to Japan. Montana is primarily exporting spring rather than winter wheat. This data is vital in determining the future demand for Montana wheat. Other parts of the research will include a market share analysis of U.S. exports in total and for the Asian market. A study of the projected demand for wheat in Asia will be made as well as a study of the factors that determine the U.S. market share in the Japanese market.

PERFORMING AGENCY: Montana State University, Bozeman Department of Agricultural Economics/
INVESTIGATOR: Cramer, GL
SPONSORING AGENCY: Department of Agriculture, Montana, Cooperative State Research Service/ 0030815 MONB00055,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (GY 30815 3)

20 051256
ECONOMIC EFFECT OF CHANGING RAILROAD SYSTEMS ON GRAIN HANDLING FIRMS

OBJECTIVE: Estimate the effect of railroad abandonment or reduced service on country elevator operations. Determine the needed adjustment in the grain industry resulting from railroad abandonment or reduced services. Evaluate alternative options open to country elevator operations in adjusting to these changes. Estimate the effect of these changes on the flow of grain shipments. APPROACH: Develop a model describing the grain transportation system in Iowa. Collect data for use in the model. Complete the analyses required to achieve the objectives. PROGRESS: The model has been completed and the basic data to run the model have been collected. The model and data were tested on a small area in North Central Iowa. The results appeared to be good. At the present time, the model is being applied to 6-1/2 county area in Northwest Iowa. The purpose of this work is to determine the optimum number size and types of elevators in the area and the optimum mode of transportation of grain out of the area.

PERFORMING AGENCY: Iowa State University, Agricultural Experiment Station
INVESTIGATOR: Baumel, CP Thompson, WH
SPONSORING AGENCY: Department of Agriculture, Iowa, Cooperative State Research Service/ 0056040 IOW01810,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (GY 56040 5)

20 051258
IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAIN AND FARM SUPPLY FIRMS

OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties; Estimate demand for feed and fertilizer: project alternate changes in grain transportation; Determine economic feasibility of alternative systems of grain movement from producers to destinations; Determine effect of changes on number, size, type and location of country elevators and on local employment and services; Determine consequences of projected transportation changes on distribution of feed and fertilizer; and develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Collection, evaluation and preparation of data for a regional model designed to evaluate economic effects of branch-line rail abandonments. A six-county area in south-central Nebraska is the focus of a case study of abandonment implications. Results will aid elevator operators and other grain shippers in investment and other management decisions. Results of an economic-engineering analysis of grain trucking costs are being edited for publication. Average per unit costs were found to be affected by truck size, average length of haul and annual volume. Operating costs, particularly the cost of fuel, were important factors. Results will be useful to shippers, truck owners and operators and requlatory authorities. Comparisons are being made between truck costs and published rail rates for grain shipments over various lengths of haul. Results will be of use to grain shippers in their choice of mode and will offer guidelines to feasibility of private truck carriage. There may also be implications for regulatory rate and service policies. Dr. J.R. Felton, has been analyzing the supply-demand aspects of rail grain shipments. Included in his findings is a proposed market allocation system for freight cars. The system would substitute market pressures for present authoritarian car allocation methods and would render car shortages impossible in an economic sense.

PERFORMING AGENCY: Nebraska University, Lincoln Agricultural Experiment Station, Agricultural Economic
INVESTIGATOR: Anderson, DG
SPONSORING AGENCY: Department of Agriculture, Nebraska, Cooperative State Research Service/ 0060519 NEB-10-062,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (GY 60519 2)

20 051259
IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAIN AND FARM SUPPLY FIRMS

OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties; Estimate demand for feed and fertilizer. Project alternate changes in grain transportation; Determine economic feasibility of alternative systems of grain movement from producers to destinations; Determine effect of changes listed on number, size, type and location of country elevators and on local employment and services; Determine consequences of projected transportation changes on distribution of feed and fertilizer; and Develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Optimal transportation system solutions have been obtained for corn and soybeans shipped out of a 1-1/2 county area around Fort Dodge, Iowa. These solutions were based on a Stollsteimer type two stage, multiperiod transhipment plant-location model. Transportation Alternatives Studies included the traditional single-car system, 3-10-car shipment, 50-car, 80-car and 115-car trains, truck, truck-barge, rail-barge, containers and belt lines. Generally, the highest net revenue was obtained by using a subterminal system to assemble large quantities of grain into multiple-car shipments. The optimum number of subterminals varied depending on the rate structure and the amount of rail maintained in each analysis.

PERFORMING AGENCY: Iowa State University Agricultural Experiment Station
INVESTIGATOR: Baumel, CP Thompson, WH Wisner, RN
SPONSORING AGENCY: Department of Agriculture, Iowa, Cooperative State Research Service 0060521 IOW01929,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (GY 60521 2)

20 051260
IMPACT OF CHANGING TRANSPORTATION SYSTEMS ON LOCAL GRAINS AND FARM SUPPLY FIRMS
OBJECTIVE: Estimate quantities of grain that will move through country elevators and commercial channels in 1975 and 1980 by counties. Estimate demand for feed and fertilizer. Project alternate changes in grain transportation. Determine economic feasibility of alternative systems of grain movement from producers to destinations. Determine effect of changes on number, size, type, and location of country elevators and on local employment and services. Determine consequences of projected transportation changes on distribution of feed and fertilizer, and develop guidelines which individual firms can use in investment and transportation decisions. APPROACH: Will obtain data through survey schedules, transportation rate information, and published reports. Develop models which will give estimates by counties and geographic units, evaluate alternative modes of transportation, project changes, and generate least cost information for various situations. PROGRESS: Least-cost movement pattern for Kansas wheat has been estimated by computer model for 1971-72 and compared with market flows as determined by market survey. Estimates of fertilizer consumption by county for Kansas for 1975 and 1980 is nearing completion. Development of origin points and quantities and transport rate data is in progress to be used in a least-cost flow model.

PERFORMING AGENCY: Kansas State University Agricultural Experiment Station, Department of Agri Eco
INVESTIGATOR: Sorenson, LO Mccoy, JH
SPONSORING AGENCY: Department of Agriculture, Kansas, Cooperative State Research Service/ 0061435 KAN00843,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1974
COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (GY 61435 2)

20 054564
A RATE-COST ANALYSIS OF NEBRASKA LIVESTOCK AND MEAT TRANSPORTATION WITH GRAIN SHIPMENT COMPARISONS
OBJECTIVE: Determine geographic patterns of interstate shipments of Nebraska livestock and meat. Determine extent to which hackhauls are available and economically significant to livestock and meat truckers. Measure costs of truck shipments of livestock and meat. Obtain truck and rail rates for livestock and meat shipments. Compare truck costs with truck and rail rates. Compare costs and rates for livestock and meat shipments with those for grain shipments. APPROACH: Descriptive information will be obtained from packers, processors, feeders, shippers and carriers. Rates will be collected from regulatory agencies. Truck costs will be synthesized from economic-engineering evidence. Regression analysis will be used for rate-cost comparisons.

PERFORMING AGENCY: Nebraska University, Lincoln Agricultural Experiment Station, Agricultural Economics
INVESTIGATOR: Anderson, DG
SPONSORING AGENCY: Department of Agriculture, Nebraska, Cooperative State Research Service/ 0063941 NEB-10-068,

STATUS: Active NOTICE DATE: Dec. 1973 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (GY 63941)

20 055810
TRANSPORTATION SYSTEM DEVELOPMENT FOR ALASKA
This project is directed at the analysis of policy and transportation system development alternatives upon the economy of the State of Alaska as well as upon the performance of the intercity freight transportation networks. A macroeconomic model, previously developed by the Brookings Institution shall be adopted for use in representing the basic structure and interrelationships of the Alaskan economy. A transportation network simulation model shall also be developed as part of this effort which includes each of the major intercity freight carrying modal systems operating or expected to be operating in Alaska.

PERFORMING AGENCY: Alaska University
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973
COMPLETION DATE: Oct. 1976 TOTAL FUNDS: $ 375418 Contract DOT-OS-40008 (CS)

ACKNOWLEDGMENT: Office of Systems Development and Technology/OST (PR# PUR-2-30685)

20 071570
MEASURING PRICE AND SERVICE ELASTICITIES OF DEMAND FOR AGRICULTURAL TRANSPORTATION
OBJECTIVE: Develop data on rate levels and service characteristics for shipments of agricultural commodities and apply one or more models of analysis to estimate price and service elasticities and cross-modal elasticities of demand for transportation. Evaluate economic importance of findings. APPROACH: Obtain data on freight charges or costs of alternate modes of transport for specific commodity movements, travel time, waiting time, variability in travel time, and probability of loss in quality and/or other value-determining attributes of the commodities in transit. Apply logic, regression or reduced-form and/or simultaneous-equations' models of analysis to the data. Assess implications of elasticities and cross-elasticities of demand for rate-making policies of transportation firms in various areas and for various commodities, and for governmental policies regarding inter-modal competition, modal promotional efforts, as means of achieving better transportation services for agriculture.

PERFORMING AGENCY: Washington State University U.S.D.A. Marketing Econ. Div., Competition & Pricing Branch
INVESTIGATOR: Miklius, WJ
SPONSORING AGENCY: Department of Agriculture, Economic Research Service, Marketing Economics Division 0040518 ME11-26-50-01-X1,

STATUS: Active NOTICE DATE: Mar. 1974 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (GY 40518)

20 071571
ORGANIZATION AND PERFORMANCE OF TRANSPORTATION SYSTEMS
OBJECTIVE: Estimate annual indexes of rail and ocean freight rates, and develop procedures and estimate periodic indexes for truck and inland water freight rates for agricultural commodities. Estimate the nation's annual transportation bill for U.S. farm foods. Analyze effects on rates and costs of various organizational and regulatory changes made or proposed for transportation systems serving agriculture. APPROACH: Use ICC tariffs for obtaining rail and regulated truck rates. Obtain ocean rates from commercial reports of ship charters and rates for exempt commodity movements by highway and inland waterway through surveys. Revise current indexes and develop new ones from rate information used in conjunction with data on origins, destinations, conditions of shipment and volume of movement. Use rate indexes and quantities of U.S. farm foods marketed to estimate transportation bills. Use qualitative systems analyses based on information from various primary and secondary sources to evaluate effects on rates and costs of organizational and regulatory changes. PROGRESS: Rail freight rate indexes for agricultural commodities increased substantially in 1971, and the estimated transportation bill for U.S. farm foods increased $0.8 billion to $6.0 billion. Ocean voyage charter rates for heavy grains, however, continued to decline in 1971 in response to increased world shipping capacity. Provided economic evaluation of transportation rate and service proposals; evaluation of adequacy of earlier research on effects of the agricultural exemption in interstate trucking; and evaluation of performance research needs of livestock transportation.

PERFORMING AGENCY: Department of Agriculture, Economic Research Service, Marketing Economics Division
INVESTIGATOR: Gerald, JO
SPONSORING AGENCY: Department of Agriculture Economic Research Service, Marketing Economics Division 0016402 ME11-2-54-00,

STATUS: Active NOTICE DATE: Feb. 1974 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (GY 16402 5)

20 080313
DEMAND INFORMATION AND FORECASTING RESEARCH PROJECT
To develop functional specifications for an advanced demand information and forecasting system to support intra-railroad car distribution. The system will be sufficiently generalized that it could be adopted by most Class I railroads on a voluntary basis. Phase I of the project will concentrate on identifying the requirements of the data system and the most promising forecasting technique. Sample data from several railroads will be collected and analyzed to provide information about the current environment and assocated problems. In Phase II, the recommendations of Phase I will be implemented on a Class I railroad. This demonstration is expected to provide the framework for evaluating the technical feasibility, operational suitability and economic desirability of the systems for other carriers.

PERFORMING AGENCY: Association of American Railroads
INVESTIGATOR: Minger, WK (Tel. 202-293-6256)
SPONSORING AGENCY: Association of American Railroads, Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Braddock, C (Tel. 6-2920)

STATUS: Active Contract DOT-FR-30058

20 080328
CANADIAN FREIGHT TRANSPORTATION MODEL: PHASE III
This study develops a planning model for the Canadian Freight Transportation System to assist in evaluating the effects of long range transport policies on the performance of the rail freight transport network in Canada. Phase III consists of validation of the network model and development of modal selection models using the intermodal freight data base.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 5.10
INVESTIGATOR: Fullerton, HV Peterson, ER Turner, RE
SPONSORING AGENCY: Transportation Development Agency, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1971
COMPLETION DATE: Dec. 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 080334
DATA MANAGEMENT SYSTEM FOR TRANSPORTATION DATA BASE
An existing intermodal freight transport data base containing rail, ship and for-hire trucking data on a common origin/destination/commodity basis for all of Canada is now being adapted for more general use by researchers. This permits intermodal freight traffic analysis to a degree of detail never before possible.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 5.14.73
INVESTIGATOR: Graham, LJ
SPONSORING AGENCY: Canadian Institute of Guided Ground Transport, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: Oct. 1973
COMPLETION DATE: Sept. 1975

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

20 100248
A SIMULATION MODEL FOR ESTIMATING THE EFFECTS OF RATIONALIZING THE GRAIN COLLECTION, HANDLING AND DISTRIBUTION SYSTEM UPON THE PRAIRIE ECONOMY
The objective is to develop a framework in which rationalization of the grain transportation system in western Canada can be analyzed with respect to rural community effects. The system's approach will be employed at a regional level to assess the impact of railway branch-line abandonment and elevator closure upon the economy of prairie communities affected. Simulation and evaluation of some rationalization proposals in a specified bounded production region will occur to estimate the change in direct employment income to the region with total effect to be estimated by deriving a local multiplier. Tax revenue changes and changes in local infrastructure investment and maintenance—chiefly roads—will also be estimated.

PERFORMING AGENCY: Manitoba University, Canada
INVESTIGATOR: Magarrell, HK Tyrchniewicz, EW
SPONSORING AGENCY: Transportation Development Agency

STATUS: Active NOTICE DATE: Dec. 1973 START DATE: Sept. 1973
COMPLETION DATE: Oct. 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

21 036356
NATIONAL CONTAINER NETWORK FEASIBILITY STUDY
Historical analysis of current TOFC-COFC service, container traffic flow identification container network operating costs, network service differential criteria, network route and node specifications, network line, terminal and facility analysis, network investment requirements, network service package and profitability, network organization and funding requirements, analysis of network benefits.

PERFORMING AGENCY: Reebie (Robert) and Associates, Incorporated
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: DeBoer, D (Tel. 202-426-9682)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1972 COMPLETION DATE: Mar. 1975 TOTAL FUNDS: $ 539987 Contract DOT-FR-20065 (CPFF)

ACKNOWLEDGMENT: FRA

21 044568
YARD AND TERMINAL SUBSYSTEM (YATS)
YATS is a subsystem of Missouri Pacific's Transportation Control System (TCS) and is designed to increase the efficiency of railroad operations at major terminals. YATS will assist operations by maintaining a computerized car inventory, supporting local management information requirements, generating car classification work orders, relieving the clerical data entry burden, and providing a real-time, online data base for local operations analysis. YATS is being developed on a Digital Equipment Corporation (DEC) PDP-11 mini-computer.

PERFORMING AGENCY: Missouri Pacific Railroad
INVESTIGATOR: Bryan, LM (Tel. 314-6222075)
SPONSORING AGENCY: Missouri Pacific Railroad
RESPONSIBLE INDIVIDUAL: Shattuck, JA (Tel. 314-6222376)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1971 COMPLETION DATE: Jan. 1975 In-House

ACKNOWLEDGMENT: Missouri Pacific Railroad

21 044569
CARS: CAR ACTIVITY REGULARIZING SCHEDULER
The purpose of the CARS model is to simulate the over-the-road portion of the Missouri Pacific's on-line car scheduling system and to evaluate the data used to drive this on-line system. A pilot program which simulates car scheduling over a portion of the Missouri Pacific network is operational. Current and future efforts are directed towards insuring compatability of the model with the on-line system and expanding the model's data base to include the entire Missouri Pacific system. The CARS model is made up of three major subprograms—the Preprocessor, the Simulator and the Post processor. The Preprocessor accepts train schedules and blocking policy as input and builds the scheduling files required by the Simulator. The Simulator runs the network for a specified period of time. It accepts car-dependent records as input and schedules these cars to the through and local train required to move them to their respective destinations. Statistics from the Simulator are bled off for analysis by the Postprocessor. The Postprocessor measures the efficiency of the scheduling data base by generating reports on yard and train performance and on transit time reliability.
REFERENCES:
Railroad Car Scheduling System Incorporating Car Scheduling Yoakum, RL; Beaumont, LH, Missouri Pacific Railroad, Jan. 1972

PERFORMING AGENCY: Missouri Pacific Railroad
INVESTIGATOR: Fuller, JH (Tel. 314-6222566), Keller, DC (Tel. 314-6222566)
SPONSORING AGENCY: Missouri Pacific Railroad
RESPONSIBLE INDIVIDUAL: Fuller, JH (Tel. 314-6222566)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1971 COMPLETION DATE: Dec. 1974 In-House

ACKNOWLEDGMENT: Missouri Pacific Railroad

21 045142
INSTALLATION OF A RAIL TERMINAL MANAGEMENT SYSTEM (RTMS)
The Railway Terminal Mangement System and Intermodal Terminal Management Systems are developmental systems. This installation represents the first full-yard implementation and encompasses the use of automatic car identification scanners, wheel directional sensors, mini-computers and other related equipment at Deramus Yard, Shreveport, Louisiana and will permit a real-time inventory of the terminal to be maintained. As cars enter the yard a switch list preparation is automatically prepared and when trains are dispatched, an accurate consist list is immediately available. The Railway Terminal Management System and Intermodal Terminal Management Systems are expected to be beneficial, both to the railroad in the form of increased efficiency and to the general shipping public in reduced delays and improved service.

PERFORMING AGENCY: Kansas City Southern Railway, Louisiana and Arkansas Railway
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Wacker, WF, Jr

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973 COMPLETION DATE: July 1976 TOTAL FUNDS: $ 400000 Contract DOT-FR-30047

ACKNOWLEDGMENT: FRA

21 048795
CONTAINERIZATION IMPACT STUDY
This agreement is to provide funding for new OST(TPI) portion of a containerization impact study to be conducted by the Federal Highway Administration.

PERFORMING AGENCY: Federal Highway Administration
SPONSORING AGENCY: Office of Policy, Plans and International Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Stanley, RL (Tel. 202-4260724)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1973 TOTAL FUNDS: $ 30000 ID AS-30063

ACKNOWLEDGMENT: Office of Policy, Plans and Intl Affairs/OST (PR DOT-AS-30063)

21 054698
IMPROVEMENT IN COUPLING-UP PERFORMANCE IN AUTOMATIC MARSHALLING YARDS
In classification yards of the North American pattern, the free-running cars do not always couple as intended: stalls and overspeed impacts cause $10 million annual avoidable damage to freight and cars in Canada, and $100 million annually in the U.S.A. A "Monte Carlo" simulation has been constructed using the IBM 360/50 which is extremely realistic in its simulated assembly of trains. Using it, better methods of constructing and instrumenting the yard are shown to be possible, realizing a 75% reduction in the damage figures.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 3.7
INVESTIGATOR: Kerr, CN
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

21 054702
CANADIAN FREIGHT TRANSPORT MODEL
The aim of this research is to model the flow of commodity freight in Canada, in order to assist industry and government planners in evaluating future changes to the transport system. The rail transport mode is emphasized, but the effects of competition by other modes are included. An optimizing network flow model of the mainline operation of a railroad is developed. This model predicts the optimal routing of traffic and the congestion at each yard and over each track section in the system. Congestion-dependent expressions are included for time delays in the yards and over-the-road. The time-optimal assignment pattern for railcar flow is then obtained for a given set of origin-destination demands for railcar movement, using a new assignment algorithm. The mainline Canadian rail networks of both CN and CP are modelled. Historical railcar tracing data are summarized and compared with model predictions. A model of modal choice by shippers is also developed in order to obtain modal splits of commodity forecasts. Relative usage of various modes is represented as a

function of both modal and shipment characteristics, and the relationships are tested statistically. To provide the necessary empirical data, an extensive data base has been collected incorporating historical commodity freight data on volume, cost, time and location of rail, ship and for-hire truck movements in Canada. Common codes for commodity grouping are developed to integrate the diverse modal schemes currently used, and the data are transformed to a common regional basis.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 5.10
INVESTIGATOR: Fullerton, HV Turner, RE Peterson, ER
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1971 COMPLETION DATE: Apr. 1974

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

21 054704
DEVELOPMENT OF INTERMODAL NORTHERN TRANSPORTATION NETWORKS
The research will examine alternate structures of freight transport networks in the Western Canadian Arctic. Intermodal combinations will be examined to determine the minimum cost pattern of transport investment that will at the same time stimulate economic development.

PERFORMING AGENCY: Queen's University, Canada
INVESTIGATOR: Dunford, FE
SPONSORING AGENCY: Transportation Development Agency

STATUS: Active NOTICE DATE: Aug. 1973 START DATE: May 1973

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

21 058252
ANALYSIS OF CLASSIFICATION YARD TECHNOLOGY
This study comprises a survey and assessment of the state-of-the-art in rail freight car classification yard technology. Separate tasks include establishment of a detailed description of the hardware, costs, performance characteristics, and operational practices of existing yards; formulation of general yard-network interaction concepts; collection of detailed background information concerning the yard population in the United States, categorized by type, technology, and function; estimation of the demands likely to be placed upon the nation's network of freight car terminals during the forseeable future, and an assessment and prioritization of those areas of terminal operations which warrant further technological research or development.

PERFORMING AGENCY: Stanford Research Institute
INVESTIGATOR: Siddiquee, W (Tel. 415-326-6200)
SPONSORING AGENCY: Transportation Systems Center, Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Abbott, R (Tel. 617-494-2250)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Jan. 1975 COMPLETION DATE: Nov. 1975 TOTAL FUNDS: $ 87781 Contract DOT-TSC-968

ACKNOWLEDGMENT: FRA

21 058253
TOFC/COFC AERODYNAMIC DRAG STUDY
The objective of this effort is detailed formulation of an experimental program which will determine the aerodynamic drag of various methods of transporting containerized freight on railroad flatcars. The future program to be defined in the current effort will include aerodynamic testing of trailers on flatcars (TOFC), containers on flatcars (COFC), and proposed techniques for reduction of drag through streamlining.

The contract to a performing organization has not yet been awarded.

SPONSORING AGENCY: Transportation Systems Center Federal Railroad Administration Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Barrows, T (Tel. 617-494-2541)

STATUS: Proposed NOTICE DATE: Feb. 1975 START DATE: Sept. 1975 COMPLETION DATE: Apr. 1976

ACKNOWLEDGMENT: FRA

21 058275
PARAMETRIC ANALYSIS OF RAILROAD LINE CAPACITY
The contractor has developed a parametric analysis of rail line capacity. The basic parameters analyzed include number of tracks, siding spacing, crossover type and location, signal system type and configuration, train speed and priority, number of trains, train weight, and mix of trains by speed, priority, time of day and directions, maintenance requirements, and dispatching policies. The contractor determined which parameters and the values thereof are significant to line capacity and their impact on the capacity.

PERFORMING AGENCY: Peat, Marwick, Mitchell and Company
INVESTIGATOR: Prokopy, JC (Tel. 202-223-9525)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Edson, WD (Tel. 202-426-0771)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Mar. 1975 Contract DOT-FR-4-5014

ACKNOWLEDGMENT: FRA

21 058278
TRUCK/RAIL INTERMODAL OPERATIONS: AN OPTION FOR THE FUTURE
The approach taken in determining whether or not an advanced intermodal service would have advantages was a case study, in which a particular traffic corridor is examined in terms of economic geography; topography; existing and projected traffic flows; service and cost capabilities of existing carriers; and prevailing shipper modal preference criteria. Then the cost and service characteristics achievable by an advanced intermodal service were developed, and the containerizable traffic potentially divertible to such a service from existing modes was estimated. The traffic corridor selected was Los Angeles-Sacramento- Portland.

PERFORMING AGENCY: Reebie (Robert) and Associates, Incorporated
INVESTIGATOR: Ainsworth, D (Tel. 203-661-8661)
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Newkirk, J (Tel. 202-426-0771)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1973 COMPLETION DATE: Sept. 1975 Contract DOT-FH-11-8158

ACKNOWLEDGMENT: FRA

21 058279
SYSTEMS ENGINEERING FOR INTERMODAL SYSTEMS
The objective of the systems engineering effort in connection with intermodal systems is to define and analyze the great number of variables that affect the design, layout and equipment for use in a rail-highway intermodal system. The areas to be investigated include the functions required of gateway and intermediate terminals (light density as well as heavy density service in each type of terminal), the equipment needed to operate an efficient system such as rolling stock, handling equipment and propulsion and the control processes necessary to optimize utilization of plant. It is anticipated that test and evaluation of the design concepts selected will be conducted in cooperation with the railroad industry and local and state governments on a cost sharing basis.

The contract to a performing organization has not yet been awarded.

SPONSORING AGENCY: Federal Railroad Administration, Office of Research, Development and Demonstrations
RESPONSIBLE INDIVIDUAL: Bang, AJ (Tel. 202-426-0855)

STATUS: Proposed NOTICE DATE: Feb. 1975 START DATE: July 1975 COMPLETION DATE: June 1978

ACKNOWLEDGMENT: FRA

21 080318
IMPROVEMENT OF AUTOMATIC COUPLING-UP PERFORMANCE IN MARSHALLING YARDS
A Monte Carlo simulation of a marshalling yard is being used to determine the degree of impact damage resulting from this operation. The

model will assess the effects of track gradient and release speed definition on overall yard operation.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 3.7.74
INVESTIGATOR: Kerr, CN
SPONSORING AGENCY: Queen's University, Canada, Canadian Institute of Guided Ground Transport

STATUS: Active NOTICE DATE: May 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

21 080329
ARCTIC TRANSPORTATION RESEARCH
This research defines and evaluates the efficiency of a spinal regional transportation system in a lesser developed region such as the Western Arctic, and identifies the criteria prerequisite to the development of a spinal network. The specific case considered is the proposed Mackenzie Valley Corridor.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 7.6.74
INVESTIGATOR: Dunford, FEF
SPONSORING AGENCY: Donner Canadian Foundation, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: Apr. 1973
COMPLETION DATE: Sept. 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

21 080331
FEASIBILITY STUDY OF RAILWAY DIMENSIONAL LOAD ANALYSIS USING A SMALL LOCAL COMPUTER
The feasibility of using a small local computer to perform railcar clearance calculations for dimensional (oversized) railcar loads is being investigated. Fast turnaround of the clearance data request and a computer plot of obstructions is incorporated.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 5.15.73
INVESTIGATOR: Beattie, DG
SPONSORING AGENCY: Canadian National Railways, Queen's University, Canada

STATUS: Active NOTICE DATE: June 1974 START DATE: Jan. 1974
COMPLETION DATE: Sept. 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

22 052066
FREEZING PROBLEMS DURING RAIL TRANSPORTATION
Study to determine methods processes or equipment to eliminate or minimize delays in discharging granular bulk materials (coal ore, etc.) from rail cars under freezing conditions.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport Queen's University
INVESTIGATOR: Colijn, H
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

22 054568
IMPROVING TRAILER VANS AND CONTAINERS FOR TRANSPORT OF PERISHABLE FOODS
OBJECTIVE: Develop design criteria and specifications necessary for improving environmental control systems in transport vehicles and develop, test, and evaluate such improvements. APPROACH: Standard testing methods for rating performance of loaded refrigerated trailers and van containers will be developed. Development of this method and its related empirical data will provide a basis for realistic design and performance specifications for such vehicles and as a yardstick for evaluating improved refrigerated vehicles and modifications of conventional equipment. Shipping experiments will be made to develop additional performance data and data on cost of fuel, servicing, and maintenance to determine operating and ownership cost of improved equipment. PROGRESS: Stationary tests on prototype van container with simulated load by loading patterns to determine air circulation efficiency and cooling efficiency were completed; concurrently, simulated load test methodology was developed to a point where its evaluation must await results from field tests of real loads. Modifications on the prototype have been completed. Field testing with shipments of real loads originating from Texas to domestic markets has commenced.

PERFORMING AGENCY: Department of Agriculture, Horticultural Research Laboratory
INVESTIGATOR: Goodard, WF
SPONSORING AGENCY: Department of Agriculture, Agricultural Research Service 0022041 TF4-215,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974 ID

ACKNOWLEDGMENT: Science Information Exchange (GY 22041 2)

22 054569
IMPROVED PACKAGING OF CELERY FOR EXPORT TO EUROPE
OBJECTIVE: Improve packaging of celery to reduce costs of packing, handling, and transport to overseas markets and to increase foreign market acceptance. APPROACH: Develop better packages and shipping containers. Test in laboratory, commercial packing plants, transport vehicles—trucks, railroad cars, and ships,—terminal warehouses, and wholesale and retail stores. By time studies, interviews, container and product examination, and from records and tariffs, gather data on container and celery damage, foreign market acceptance, and costs of materials, packing handling, storage, and transport. Compare cost of using new and presently-used packages and shipping containers. PROGRESS: A dispute over high ocean freight rates for celery has reduced exports to a very low level. One test shipment was made of celery that was trimmed to 11" and individually sleeved and packed 36 stalks to the box. The load arrived in excellent condition with no damage or decay. The arrival temperatures ranged from 36 to 38 F (thermostat on the van container was set at 37). Consumer acceptance was high and the receiver immediately reordered. Several commercial shipments were made after the initial test shipment.

PERFORMING AGENCY: Department of Agriculture, Horticultural Research Laboratory
INVESTIGATOR: Hale, PW
SPONSORING AGENCY: Department of Agriculture, Agricultural Research Service 0021702 TF4-210,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974 ID

ACKNOWLEDGMENT: Science Information Exchange (GY 21702 2)

22 071572
IMPROVED TRANSPORT EQUIPMENT AND TECHNIQUES FOR OVERSEAS SHIPMENTS OF FRUITS AND VEGETABLES
OBJECTIVE: Find more efficient, less costly ways of transporting fresh fruits and vegetables to overseas markets. APPROACH: Make paired test shipments by usual break-bulk method and in container vans. Measure transport, damage, refrigeration, insurance, documentation and handling costs. Develop and test improved load patterns, transport refrigeration and handling equipment and techniques. Obtain data on labor, material and capital inputs by time and cost studies for the land-sea-land movement of the products. Similar work also done at Orlando, Florida (See Work Units TF 4-220 and 4-220A). The only difference between this project and TF 4-220A is the emphasis placed on special commodities. (See items 62 through 66). PROGRESS: A modified 7/10-bushel corrugated fiberboard citrus carton was tested and compared with conventional cartons of the same style. The modified carton is distinguished from the conventional carton in that it has a greater amount of total package ventilation with these openings being in only the top and bottom of the carton. The features and advantages of the modified carton revealed in the study are: the modified carton can be stacked "in register", thus forcing cool air to move through the carton instead of around it, resulting in more efficient air circulation; refrigerated trailers, when stacked "in register" were more compactly stacked for greater load density and were more stable in transit; stacking cartons "in register" utilizes their structural strength thus protecting the contents, whereas "air stacking" cartons does not utilize the inherent structural strength, thereby increasing the possibility of carton failure, thus damaging the contents; palletization can be accomplished with the modified carton resulting in reduced cost of handling for loading and unloading.

PERFORMING AGENCY: Department of Agriculture, Transportation & Facil. Div., Transportation Research Br
INVESTIGATOR: Camp, TH
SPONSORING AGENCY: Agricultural Research Service Transportation & Facilities Research Division, USDA 0022083 TF4-220B,

STATUS: Active NOTICE DATE: Feb. 1974 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (GY 22083 2)

22 080131
SYSTEMS ANALYSIS OF THE ECONOMICS OF GRAIN MARKETING
OBJECTIVE: Investigate the operations of marketing systems as they affect: The economics of physical distribution and processing of grains; and managerial decision-making by grain marketing firms. APPROACH: A spatial equilibrium model of the grain marketing system will be developed to determine the optimum size, type and number of firms. Parametric programming will be used to simulate various conditions of supply, demand, technology and transportation rates and the effects on the market structure will be traced within the model. Will examine existing managerial decision-making models for grain marketing firms and adopt or create new models. Operating parameters and external constraints of marketing firms will be analyzed. Data will be obtained from private and public agencies including EDP companies and trade associations. PROGRESS: Data on storage capacities of existing grain facilities was compiled and used as a basis for selecting alternative plant sizes to be considered in the model. Areal delineations were made and production and consumption estimates were obtained corresponding to these areas. Direct and published sources were used to obtain truck and rail transportation rates. Selected elevators in each size group were surveyed to obtain operating cost data and information concerning operating revenues and annual storage and handling volumes. Annual expense budgets were developed for each size group to determine operating cost per unit of grain. A spatial equilibrium model of the subject area's grain marketing system is being constructed. The spatial equilibrium model is constructed so that the parameters in the model can be changed to depict alternative conditions of supply, demand and technology and thus permit their effects on the sys-

tem to be analyzed. The introductory, theory and methodology sections of the research report have been written.

PERFORMING AGENCY: Oklahoma State University, Stillwater Agricultural Experiment Station
INVESTIGATOR: Oehrtman, RL
SPONSORING AGENCY: Department of Agriculture, Oklahoma Cooperative State Research Service 0060577 OKL01521,

STATUS: Active NOTICE DATE: Oct. 1974 START DATE: July 1974 COMPLETION DATE: June 1975

ACKNOWLEDGMENT: Science Information Exchange (GY 60577 2)

22 080322
THERMAL CONDUCTIVITY MEASUREMENTS OF MOIST BULK MINERAL CONCENTRATES UNDER FREEZING CONDITIONS
An experiment to determine the thermal conductivity characteristics of various moist bulk mineral concentrates under freezing conditions is underway. The parameters determined will be used in the mathematical model of the freezing process now being developed under this programe. (See Oosthumisen, Colijn)

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 3.25.74
INVESTIGATOR: Paterson, J
SPONSORING AGENCY: Canadian National Railways, Canadian Pacific, Noranda Research, Queen's University, Canada

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1973 COMPLETION DATE: Apr. 1976

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

22 080323
DEVELOPMENT OF A MATHEMATICAL MODEL OF FREEZING AND THAWING IN A RAILCAR
This study will develop a 3-dimensional heat transfer model of a railcar containing a moist granular material. Its objective is to permit rapid simulation studies of the movement of specific commodities under various freezing weather conditions to determine the extent and character of the freezing process. It is part of the overall freezing research program. (See Colijn, Paterson).

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 3.24.73
INVESTIGATOR: Oousthuizen, PH
SPONSORING AGENCY: Canadian National Railways, Noranda Research, Queen's University, Canada, Canadian Pacific

STATUS: Active NOTICE DATE: May 1974 START DATE: May 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

22 111280
FOOD PRESERVATION SYSTEMS
The objective of the project is to improve present systems and develop new systems for the preservation of food including cereal grains, cereal products, oilseeds, fresh vegetables and fruit. The transporting, storing and processing of foods as they move from the farmers' field to the consumers' table is to be considered as a complex interrelated system. The two computer simulation programs already developed to predict temperatures in unaerated and aerated grain bins will be combined. Then this program will be developed to simulate the complete grain preservation beginning with the standing crop in the field and ending with the delivery of the grain at a foreign country.

PERFORMING AGENCY: Manitoba University, Canada
INVESTIGATOR: Muir, WE
SPONSORING AGENCY: National Research Council of Canada

STATUS: Active NOTICE DATE: Oct. 1973 START DATE: Sept. 1973 COMPLETION DATE: Oct. 1978

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

23 048860
TRANSIT MARKETING PROGRAM
This contract is for a transit marketing program. The project will involve: market research to determine rider motivation, transit service planning, consideration of fares and scheduling, testing promotional methods at selected demonstration sites, and production of a transit marketing manual.

PERFORMING AGENCY: Grey Advertising, Incorporated
SPONSORING AGENCY: Urban Mass Transportation Administration IT-06-0078,
RESPONSIBLE INDIVIDUAL: Lee, D (Tel. 202-4269157)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Feb. 1974 COMPLETION DATE: Aug. 1975 TOTAL FUNDS: $ 465790 Contract DOT-UT-40021

ACKNOWLEDGMENT: UMTA (IT-06-0078)

23 048880
A STUDY OF TRANSIT FARE POLICIES AND THEIR IMPLICATIONS
The project will develop information on transit fares and fare structures that can: (1) identify promising techniques, (2) assess impacts, (3) instruct public policy regarding transit pricing, and (4) guide management decision-making by transit properties with regard to fare policies.

PERFORMING AGENCY: Office of Transportation Planning Analysis, Department of Transportation
SPONSORING AGENCY: Urban Mass Transportation Administration IT-06-0095,
RESPONSIBLE INDIVIDUAL: Doyle, JE (Tel. 202-4269745)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1974 COMPLETION DATE: Jan. 1975 TOTAL FUNDS: $ 25000 IA AT-40016

ACKNOWLEDGMENT: UMTA (IT-06-0095)

23 048959
CONFERENCE ON THE ADAPTIVE USE OF RAILROAD STATIONS
The objectives of the symposium are: (1) the establishment of guidelines for the adaptive use of railroad stations; (2) determining whether and what additional Federal, state, or municipal legislation or authority would provide incentives to make adaptive use of stations more attractive to the state, the municipality, the private developer and the local or regional transportation or transit authority; and(3) the establishment of a clearinghouse of information on questions relating to the adaptive use of such railroad stations.

PERFORMING AGENCY: National Endowment for the Arts
INVESTIGATOR: Freeland, J
SPONSORING AGENCY: Office of Environment, Safety & Urban Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Davis, RD (Tel. 202-4264474)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974 TOTAL FUNDS: $ 2000 IA AS-40066

ACKNOWLEDGMENT: Office of Environment, Safety & Urban Affairs/OST (PR# DOT-AS-40066)

23 055809
IMPROVEMENT OF DIRECT DEMAND MODELS FOR THE ESTIMATION OF URBAN PASSENGER TRAVEL DEMAND
The research project will further develop the state of the art in the estimation of urban passenger travel demand so that reasonably reliable techniques will be made available for estimating the influence of new transport technologies, such as rapid transit extensions, dial-a bus, or dual mode; or deregulation of taxis on the amount of urban travel, the modal split, peaking patterns, concomitant environmental impacts, and the benefits and costs stemming from implementation of new technologies or polices.

PERFORMING AGENCY: Carnegie-Mellon University
INVESTIGATOR: Schatz, E
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 50000 Contract DOT-OS-40006

ACKNOWLEDGMENT: Office of Systems Development and Technology/OST (PR# PUR-2-30596)

23 115953
APPLICATIONS OF MATHEMATICS TO TRANSPORTATION STUDIES
This is a continuation of research previously supported under GP 24617. G. Newell will continue his work on the application of mathematics to transportation system analysis. Specific topics include: 1. Optimization in public transportation systems (route location, station spacing, zoning, scheduling, and control). 2. Transportation planning (continuum approximations on networks, queueing in networks, optimal scheduling and location of facilities). 3. Queueing theory and stochastic properties of traffic.

PERFORMING AGENCY: California University, Berkeley School of Engineering
INVESTIGATOR: Newell, GF
SPONSORING AGENCY: National Science Foundation, Division of Mathematics & Physical Science/ MPS72-05068 A02,

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Aug. 1974 COMPLETION DATE: July 1975 TOTAL FUNDS: $ 25000

ACKNOWLEDGMENT: Science Information Exchange (GSP 5015 6)

24 045989
RAIL NETWORK AND MODEL FOR ANALYSIS AND EVALUATION OF ALTERNATIVE RAIL SYSTEMS WITHIN THE CONTINENTAL UNITED STATES
Conduct a detailed examination of the feasibilty of extending and expanding data and operational programs for the computation of short line mileage to produce a rail network and model for analysis and evaluation of alternative rail systems within the continental United States.

PERFORMING AGENCY: National Bureau of Standards, Department of Commerce
INVESTIGATOR: Skillington, GE
SPONSORING AGENCY: Transportation Systems Center, Department of Transportation
RESPONSIBLE INDIVIDUAL: Ostrosky, D (Tel. 617-494-2190)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 10000 IA DOT-RA-74-15

ACKNOWLEDGMENT: TSC

24 048949
IMPACTS OF PROPOSED RAIL NETWORK
The Contractor shall develop a set of Methodologies for estimating and evaluating Impacts of Proposed Rail Network changes.

PERFORMING AGENCY: Massachusetts Institute of Technology
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Pitts, HB (Tel. 202-4264311)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Oct. 1973
TOTAL FUNDS: $ 90000 Contract DOT-OS-40002

ACKNOWLEDGMENT: Office of Systems Development and Technology/OST (PR# PUR-2-30671)

24 050711
ILLINOIS CENTRAL NETWORK ANALYSIS
Railroad transportation operations are characterized by having a large number of variables with extensive interactions between variables and, in most cases, analytical techniques such as linear programming, queuing theory, game theory, etc., do not provide realistic solutions. A network simulation model will be applied to aid railroad management in determining the effects of changing facilities, operating policies, and traffic load on the performance of a railroad, thereby improving the overall system performance.

PERFORMING AGENCY: Illinois University, Urbana, Department of Civil Engineering
INVESTIGATOR: Hay, WW Reinschmidt, AJ Kim, SJ
SPONSORING AGENCY: Illinois Central Gulf Railroad

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: July 1973
COMPLETION DATE: June 1974

ACKNOWLEDGMENT: Science Information Exchange (AI 753 3)

24 055781
RAIL FACILITIES DATA
The Office of Preparedness shall update rail facilities data for use in the rail network analysis.

PERFORMING AGENCY: General Services Administration, Office of Preparedness
SPONSORING AGENCY: Office of Policy, Plans and International Affairs, Department of Transportation
RESPONSIBLE INDIVIDUAL: Leavens, D (Tel. 202-4264214)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974
TOTAL FUNDS: $ 5000 IA AS-40071

ACKNOWLEDGMENT: Office of Policy, Plans and Intl AFFAIRS/OSt (PR# DOT-AS-40071)

25 045962
PUBLIC INVESTMENT IN TRANSIT FACILITIES
To evaluate the desirability/feasibility/impact of a value capture policy across areas: 1) The Law, 2) Community enhancement, and 3) Financing. The techniques to be used rely primarily on application and evaluation of case study corridors in Houston which represent prototypical situations. Each corridor will provide a situation for the development of comprehensive strategies (legal, social, financial, physical) based upon the value capture policy. These strategies will then be evaluated. General guidance material developed and integration to evaluate the policy's overall potentials.

PERFORMING AGENCY: Rice Center for Community Design and Research
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Nupp, BL (Tel. 202-4264447)

STATUS: Active NOTICE DATE: Feb. 1975 TOTAL FUNDS: $ 75000 Contract DOT-OS-40007

ACKNOWLEDGMENT: Office of Systems Development and Technology/OST (PR# DOT-OS-40007)

25 048920
STATE RAIL PLANNING METHODOLOGY
The proposal is designed to build upon the current efforts and experience of two states to develop a framework for state rail planning which can be used by other states on their own initiative, and specifically in response to the planning requirements of the Regional Rail Reorganization Act of 1973 and the Transportation Improvement Act, upon enactment.

PERFORMING AGENCY: Wisconsin Department of Transportation
SPONSORING AGENCY: Federal Railroad Administration, Department of Transportation
RESPONSIBLE INDIVIDUAL: Sperty, JP

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: June 1974 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 90000 Contract DOT-FR-40025

ACKNOWLEDGMENT: FRA

25 048938
URBAN CONSORTIUM FOR TECHNOLOGY INITIATIVES
The function of an effective national R&D policy in transportation is to indicate how federal resources available for R&D should be distributed between and across modes. This judgment must be based on established needs and evidence of promise in both new and existing technologies, with the final decision criterion being which options for expenditure will best assure continued transportation service and maximum national benefit.

PERFORMING AGENCY: National Science Foundation
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation
RESPONSIBLE INDIVIDUAL: Linhares, A (Tel. 202-426-4208)

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974 COMPLETION DATE: May 1975 TOTAL FUNDS: $ 25000 IA DOT-AS-40063

ACKNOWLEDGMENT: Office of Systems Development and Technology

25 048978
AN EXPERIMENTAL REGIONAL TRANSPORTATION INFORMATION DIFFUSION UNIT
The contractor shall undertake experiments and conduct exploration to determine (1) the information needs of the transportation research, development, planning and administration communities in the Chicago Metropolitan Area, (2) the feasibility of a university-based information diffusion unit to act as an instrument for the dissemination of federally developed technologies to state and local transportation institutions, and (3) the impacts of the formal dissemination programs and systems upon the use of new transportation technologies.

PERFORMING AGENCY: Northwestern University, Evanston Transportation Center
SPONSORING AGENCY: Office of Systems Development and Technology, Department of Transportation

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: Apr. 1974 COMPLETION DATE: Apr. 1975 TOTAL FUNDS: $ 69706 Contract DOT-OS-40090

ACKNOWLEDGMENT: Office of Systems Development and Technology

25 054707
CONSTITUTIONAL AND GOVERNMENT ASPECTS OF TRANSPORTATION POLICY
A brief examination from secondary sources of the historical, economic, political and legal influences which have governed the development of a transportation policy in Canada and examination of the intergovernmental aspects involved in any revision or development of it in the future.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport
INVESTIGATOR: Burns, RM
SPONSORING AGENCY: Canadian National Railways, Ministry of Transport, Canada, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975

ACKNOWLEDGMENT: Canadian Roads and Transportation Association

25 080325
ECONOMIC EFFECTS OF TRANSPORTATION SUBSIDIES IN A MULTI REGION ECONOMY
A two region general equilibrium trade model, using the Scarf algorithm, is being developed to analyze the effect of transport subsidies on the relative sizes of the transport and industrial sectors of an economy, the relative size of GNP on a per capita basis, and the relative share of the GNP accruing to owners of primary inputs.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 4.31.74
INVESTIGATOR: Hartwick, JN
SPONSORING AGENCY: Canadian Transport Commission, Canadian Institute of Guided Ground Transport, Queen's University, Canada

STATUS: Active NOTICE DATE: Feb. 1975 START DATE: May 1974 COMPLETION DATE: Dec. 1974

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

25 080326
A SIMULATION MODEL FOR NORTHERN TRANSPORTATION PLANNING
A computer simulation model is being constructed to enable transport planners to evaluate alternative transport investments required to meet the freight transport needs of a northern region over a specific time horizon.

PERFORMING AGENCY: Canadian Institute of Guided Ground Transport 4.11.71
INVESTIGATOR: MacDonald, JA
SPONSORING AGENCY: Canadian National Railways, Canadian Pacific, Transportation Development Agency, Queen's University, Canada

STATUS: Inactive NOTICE DATE: Feb. 1975 START DATE: Nov. 1972

ACKNOWLEDGMENT: Roads and Transportation Association of Canada

Source Index

This index serves not only as the reference for the publications and the corporate affiliations of authors of documents appearing in this Bulletin but also as the source of the addresses for those publications that are not listed on pages vii and viii. In general, if no address is listed after the name of an organization, the entry involves an author affiliation rather than a publication. Consequently, there are multiple listings for many organizations; and all the reference numbers should be checked. Some organizations have more than one office, and again there will be more than one listing of reference numbers of possible interest. Each summary of ongoing research is indicated not only by the *A* in the reference number but also by having the entire number appear in italics.

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THE Transportation Research Board is an agency of the National Research Council, which serves the National Academy of Sciences and the National Academy of Engineering. The Board's purpose is to stimulate research concerning the nature and performance of transportation systems, to disseminate information that the research produces, and to encourage the application of appropriate research findings. The Board's program is carried out by more than 150 committees and task forces composed of more than 1,800 administrators, engineers, social scientists, and educators who serve without compensation. The program is supported by state transportation and highway departments, the U.S. Department of Transportation, and other organizations interested in the development of transportation.

The Transportation Research Board operates within the Commission on Sociotechnical Systems of the National Research Council. The Council was organized in 1916 at the request of President Woodrow Wilson as an agency of the National Academy of Sciences to enable the broad community of scientists and engineers to associate their efforts with those of the Academy membership. Members of the Council are appointed by the president of the Academy and are drawn from academic, industrial, and governmental organizations throughout the United States.

The National Academy of Sciences was established by a congressional act of incorporation signed by President Abraham Lincoln on March 3, 1863, to further science and its use for the general welfare by bringing together the most qualified individuals to deal with scientific and technological problems of broad significance. It is a private, honorary organization of more than 1,000 scientists elected on the basis of outstanding contributions to knowledge and is supported by private and public funds. Under the terms of its congressional charter, the Academy is called upon to act as an official–yet independent–advisor to the federal government in any matter of science and technology, although it is not a government agency and its activities are not limited to those on behalf of the government.

To share in the task of furthering science and engineering and of advising the federal government, the National Academy of Engineering was established on December 5, 1964, under the authority of the act of incorporation of the National Academy of Sciences. Its advisory activities are closely coordinated with those of the National Academy of Sciences, but it is independent and autonomous in its organization and election of members.